FOOD INDUSTRIES

The Journal Devoted to the Problems of the Food Manufacturer

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Laurence V. Burton, Editor

Let's Go!

TO LOOK back a few months is to become aware that business is no longer sliding downhill. To reflect on the current state of affairs is to realize that conditions are coming about which, we indicated in April, must necessarily obtain for a time before business could improve.

● CAREFUL observers and students of current affairs realize that the application of the brakes on the downhill slide has been a matter of design. It is to the credit of the administration of our government that it has dealt with fundamentals courageously and has not allowed itself to be diverted by some of the spectacular events that have recently occurred. How easy it would have been to give in to demands for pork-barrel spending, for prepayment of soldiers' endowment insurance, or many of the other fantastic schemes that have been proposed—even demanded!

● THE UNFOLDING of the government's plan of first stabilizing our economic débâcle, and next stimulating business into greater activity was hinted at in Mr. Hoover's speech of acceptance. But it is highly important that every business executive understand clearly just what has been and is now going on, and where he himself must exert his own influence for the common good of himself, his business, and the affairs of the nation.

● SEVERAL distinct moves make up the program thus far. Each must succeed the preceding in its proper order, and each must be an accomplished fact before business recovery can be had.

● WHEN our national credit was threatened in 1931, when every thinking person was genuinely alarmed, the initial steps were taken which ultimately averted the worst economic and social chaos that has ever threatend this country. They included the international moratorium, formation of the National Credit Corporation, the R.F.C., passage of the Glass-Steagall Act, and the balanced budget. The run on the dollar was stopped and our national credit saved. That much is back of us. The rest of the program lies, for the most part, ahead.

● THE SECOND MOVE is to improve bond prices to a point where private financing of corporations can be made possible. Previous moves together with open market operations and the so-called bond pool are accomplishing this end and thereby have not only improved bond prices but also have averted certain disaster to many insurance companies, which would affect everybody.

● COMMODITY PRICES need raising, particularly farm products, in order to permit agriculture to pay its debts, and stimulants to this end are being applied through private pool arrangements among banks to provide credit to enable manufacturers to replenish normal stocks of raw materials. Although food manufacturers will ultimately pay more for raw material, none will regret seeing agriculture placed on a sounder basis.

● THE NEXT STEP of the present program is to get business going in the capital goods industries. For this purpose the President called, on August 26, the National Conference of the business and industrial committees of the twelve Federal Reserve Districts to map a coordinated campaign against the depression.

● EVERY READER is urged to follow this movement closely and do everything within his power to help. One-quarter of all the unemployment in the country comes from the capital goods industries [makers of machinery and equipment]. And, for every man out of work here, there are roughly three other persons thrown out of work as direct or indirect influence of his unemployment. Approximately the same ratio applies to invested money.

● TO GET business going again, business must spend money. There is no better way to do this than by modernization. FOOD INDUSTRIES will devote the October issue to showing some of the ways to invest wisely for profit in order to get the basic industries into operation once more.

● BUSINESS can recover if individual initiative is shown by all concerns and all men, particularly those in the industries producing consumer goods. This applies also to shoes, clothing, furniture and the like, as well as to food manufactures.

● IF YOU have no plan of modernization ready yet, that is *your first step.* As soon as it is ready, then begin to invest for profits. There is nothing altruistic about it. It is for your own individual gain. We have a national plan. . . . It's your move!

...AS IT LOOKS TO US

After Ottawa, What?

A common explanation of many international squabbles is that political and geographic boundaries do not coincide. After the Ottawa conference it now becomes apparent that for real everlasting peace and tranquillity (in an era of low or declining prices), political, geographic *and economic* boundaries must coincide. And these are not to be found in the British Commonwealth of Nations.

It is difficult to foresee the immediate important effects of the conference, but our suspicions have been aroused by the unusual number of English callers at our office during the past seven weeks who have hoped that American food manufacturers would set up Canadian or English subsidiaries.

It looks bad, yet many fruitless hours spent searching for possible significant conclusions makes us wonder if they really are there. Apparently we must await further developments to be certain of what has been accomplished.

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Always Wrong

The lamentable milk strikes in the Missouri Valley once more afford a pathetic example of the errors of the multitude. The way to higher prices for milk is not via the shotgun. Dealers cannot get more for milk than the public will pay.

To get higher prices for milk in Iowa, or any other state, the remedy is to cull the herds. From Ames we learn that 12 per cent of the cows were culled and sold for slaughter in 1930, but that in 1931 only 9.9 per cent were culled out, whereas the figure ought to be 15 per cent. Time corrects many situations. Cows eventually die of old age, but an increase in price of cutter cows would better correct the situation.

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"Gypped"

No better method of combating destructive price cutting of consumer goods has come to our attention than an editorial entitled "Gypped," appearing in August *Ladies' Home Journal*. Nationally advertised brands are the consumers' guarantee of quality. The housewife is the one person who decides what is to be purchased for the home. If consumer publications continue to hammer on this point, the effect will be that the better known brands will enjoy a greater demand.

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Medicine

Many a man is now thinking how much better and cheaper it would have been to take the bitter medicine of price declines when they came, instead of putting off the day of reckoning by resorting to stabilization programs. Cling-peach control, the salmon sales plan, the various acts of the Federal Farm Board, and a host of others lie within this category, and all have been futile in preventing the ultimate disastrous end. All of which reminds us that in our younger days, whenever we tried to protect our own bad speculations by a larger margin, it never failed that we would have been better off if the broker had sold us out at the first call.

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Progress

Oats, the familiar friend of the breakfast table, now appears as crisp oat flakes, ready to serve, bearing the trade name Oat-Snaps. Purity Oats Company, of Keokuk, Iowa, has made what probably is the first fully processed pure oat product market in this country.

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Drum Dryers

Operation of atmospheric double-drum dryers ought to be well understood, but it seems to have required W. B. Combs and E. F. Hubbard, of the University of Minnesota, to provide us with measured facts. Very commendably they have reduced their figures to capacity, in pounds per hour produced, which any operating man can easily understand. Thus by preheating skim milk before applying it to the drums, the capacity increased as much as 26 per cent—from 53 pounds to 60 pounds per hour.

By increasing liquid levels, the tested capacity increased amazingly from an average of 40 pounds to 68 pounds per hour. In some tests this increase amounted to 80 per cent. Increasing the steam pressure in the drum from 60 to 85 pounds per square inch increased capacity as much as 60 per cent.

Watch the Retailer

Prize contests and advertising will get a product into the homes of consumers once, but will not keep it coming. Thereafter, the product itself must plead its own cause, and needs all the support it can get. Investigation of complaints in northern New Jersey that bread was delivered in unpalatable condition has shown that the retailer, not the manufacturer, was at fault. Are you watching the treatment your product is getting at the hands of the retailer?

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Sliced

Even in these days sales can be made larger by details that mean convenience to the consumer. Sliced bread, the "fad" of yesterday, has become a staple and is a savior of sales for some baking companies. Candy is now following its lead. At least two companies are slicing 5-cent chocolate-coated candy bars into convenient portions. An immediate response in sales is the reward for this enterprising move. Attention to details always pays.

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Danger Spot

Eight-cent cotton and higher prices for tobacco make a brighter prospect for food sales in the South, but Southerners are turning more and more to food agriculture. This year, we are informed, about 80 per cent of textile mill operatives in North Carolina will get their vegetables from their own or community gardens. Some mills, such as Cramer Mills, are canning these crops with portable equipment. Concerns selling foods in the South must watch this trend with care. Greater food sales may not follow improved purchasing power in that part of the country.

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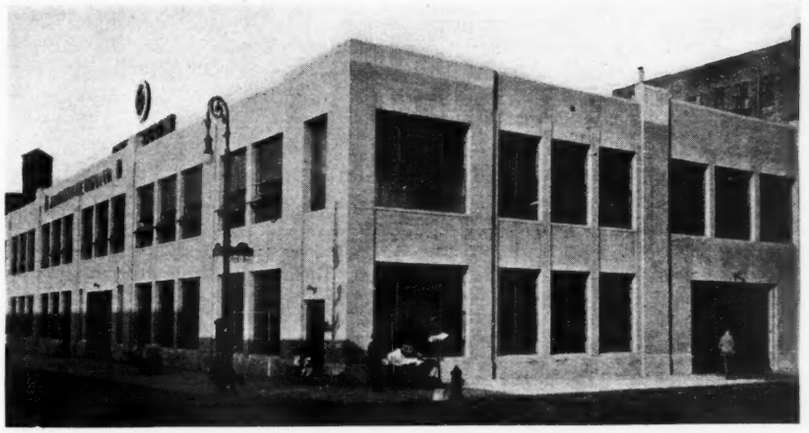
Good Work

Good packaging pays dividends in indirect ways. As a result of improved packaging of tea, and fewer claims against transportation companies, the Tea Club has succeeded in obtaining a reduced classification that effects a 15 per cent saving in freight. But it also now enables tea to be packed with other commodities—a combination that previously was prohibitively costly on account of the higher tea rates. It's hard to tell where the benefit of proper packaging leaves off.

Borden Makes 600 Motor Vehicles Pay Greater Dividends

By FRANK K. LAWLER
Editorial Department
Food Industries



Center of operations of motor vehicle department of Borden's ice cream division in New York City

DELIVERY COSTS for the average food manufacturer are entirely out of line with the efficiency maintained in production. The larger the number of cars involved, the greater this distortion is likely to be, for individual members of a large fleet frequently get out from under supervisory control. But not so in the ice cream division of the Borden Co. and associated companies in New York City. One man in the motor vehicle department of this division controls approximately 600 vehicles from a desk in the central office. So close is he in touch with each car and truck that no detail escapes his attention. For instance, if a car is operating with a tire on the right front wheel when it should be on the left rear wheel, this man will soon know about it and have the mistake corrected. This finger-tip control is backed up by a system of management and accounting and by an outlay of equipment that enables operating, repair, maintenance and liability costs to be kept at a minimum.

The center of activities of the motor vehicle department of the company is a new garage on Park Avenue, the largest garage ever built by an ice cream manufacturer. This structure and the organization that it houses are results of a detailed and comprehensive survey of Borden's delivery problems. Completed early this year, the garage, known as the J. M. Horton Garage, is a two-story, fire-proof structure occupying about 35,000 sq.ft. of space between 130th and 131st streets. It houses the central office of the motor vehicle department. It accommodates equipment for repairing and overhauling the entire fleet of the company, having the capacity to handle 1,000 cars in a year. And it serves as central garage quarters for the rolling stock of three Borden associated ice cream companies for delivery and service on all routes throughout upper Manhattan, the Bronx and Westchester.

The equipment of the car "hospital," which is on the second floor of the garage, comprises a machine shop, blacksmith shop, carpentering facilities and a row of ten benches. The machine shop, located in one corner, is equipped with a lathe, hack saw, drill press, grinder, universal grinder, boring machine, a press for straightening axles, apparatus for repairing electric starters and generators, and a precision instrument for determining whether a crankshaft is out of "true." The machines are driven by individual electric motors.

Extending along the north side of the floor, and well lighted by windows, is the row of benches. There the mechanics do the work that requires only hand tools. Suspended from the ceiling just back of these benches and extending into the machine shop is a track accommodating a chain hoist. With this hoist, the heavy parts, sometimes an entire motor, are lifted from the cars and transferred to the benches or to the shop.

Across the floor from the machine shop is the room where the blacksmiths work. Besides the usual smithing equipment, this shop is provided with oxyacetylene welding apparatus. The combined facilities of the blacksmith shop and the machine shop permit the fabrication and shaping of new parts as well as the repair of damaged ones. Of course, no precision parts are made.

To keep the valves ground, the bearings tight, and the many other major repair and overhaul jobs done on a fleet of 600 cars, sixteen first-class mechanics and a foreman are kept on the job from Labor Day to May 1, the period when all this type of work is done. Supplementing this force are two carpenters, one blacksmith and one welder. Among the mechanics are experts on the different parts of the automobile. No mechanic's helpers are employed, signifying that only competent experts put a wrench on Borden's ice cream rolling stock.

Although it may be said in general that all repair jobs are done by the company in its own garage, some special work, such as cylinder reboring, is sent outside. This is the more economical procedure, since these jobs are too infrequent to justify installation of equipment needed to handle them.

By far the larger part of the maintenance work is done in the thirteen branch garages of the ice cream division. There the vehicles are inspected and serviced daily. As each car enters the garage at the finish of its run, it stops by the gasoline pump. And the attendant not only gives g.o.w. (gas and oil and water) service but he checks the car closely for superficial defects. He inspects the water pump for leaks, turns down the grease cup on it and checks the tires, lights, signals, rear-view mirror, rear glass, tools, brake pedal and emergency lever. He also examines the body for scratches. While going through his routine of inspection, the gas man uses a flashlight instead of an extension lamp. This is to remove the possibility of a bulb being broken and gasoline fumes ignited by the hot filament—a wise precaution.

The gas pump attendant is not only responsible for checking the cars but he is charged with keeping a detailed daily record of the vehicles, called the "gas sheet." In the left-hand column of this sheet, which is placed by the gas pump at 12 a.m. each day, are listed numbers of all the cars kept in the garage. As the driver takes his car

out or in, he signs his name in the column next to his car number, and in a third column writes the time. In other columns of the gas sheet the chauffeur indicates the following: Whether his car is O.K. on coming in, and if not, whether he has filed a "trouble card" with the gas-pump attendant; whether the car was out over night or over a week-end; the work done by the car and the mileage of each job; and the quantity of gasoline or oil purchased outside, if any. In columns headed "gasoline" and "oil," the attendant writes the quantity of fuel and lubricant dispensed to the vehicle. He also sees that the mileage of the truck is reported correctly. At the bottom of the gas sheet, the attendant keeps a daily summary and inventory. And the quantity of gasoline and oil dispensed to the cars must check with the difference between the quantity on hand at the beginning of the day and that on hand at the close.

From the "faulty car" cards made out following inspection at the gas pump, as well as those filled out by the drivers, the foreman assigns the night's work to his mechanics. These men work on the cars where they are parked, using "scooters" to get underneath.

Besides repairing faults, the service men make any tire changes necessary, charge batteries that are "low" and give the cars lubrication and "laundry" service. Lubrication is done as scheduled by the central office, the schedules being prepared on a mileage basis. Oil is changed only once every 1,500 miles in cars that have filters, and tests are being made with the aim of boosting that figure.

During dirty weather, the cars are washed daily, and when the roads are dry, wiping with a soft woolen cloth takes the place of washing. The glass is cleaned with a chamois daily and the inside of the body of each truck is washed once a week. By using a 50-ft. hose, the washers may clean all the vehicles in the 120-car Horton garage without moving any of them. This hose is connected to a three-cylinder reciprocating pump driven by a 3-hp. motor and developing a pressure of 400 lb. per square inch. When a stream of water at this pressure is directed against the car, as in washing under the fenders, care is taken to strike the surface at an angle to prevent damaging the paint. When spraying the body, the washers adjust the nozzle to throw a fine spray, and this precaution is not necessary.

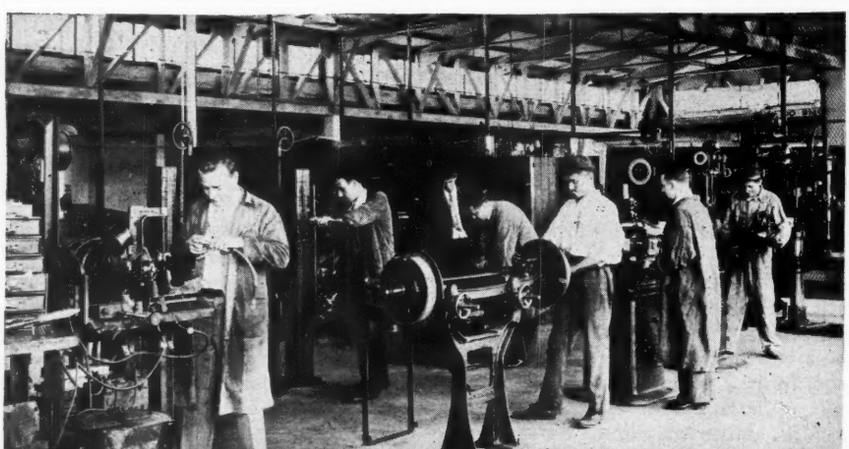
In washing the bodies, cold water is used, but hot water is employed for cleaning the ice-cream compartments of the trucks. No soap is used, since the company considers it detrimental to the finish of the cars. This saves $644 a year, the amount of the last soap bill. To clean grease from the chassis, where water will not remove it, the washers apply kerosene.

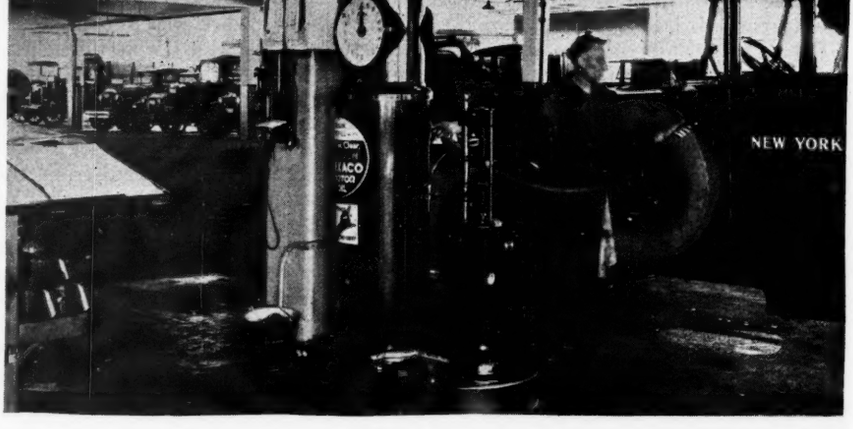
An idea of the personnel required to handle the service and maintenance work in the branch garages is gained from the fact that at the Horton garage, where 70 to 80 cars are serviced, the foreman is assisted by 2½ washers, 1 gas man, 1 lubricator and 2½ mechanics.

The foremen in the thirteen branch garages order all replacement parts from the stockroom at the central office. Each branch carries a small supply of rapid-turnover parts, such as bolts, nuts, spark plugs and gaskets, but the total value of all stocks on hand is kept within $50, on the average. In the central stockroom itself, the outlay of parts is also exceedingly small. Under the present system of operation and maintenance, the ideal stock requirements have been set at $9,000, compared to an aggregate of $40,000 formerly spread over the associated company operations.

When a branch sends in an order for stock, the man in charge of the central stockroom checks the items carefully. If he thinks the order is too large, he takes the matter up with the head of the department. In cases where several parts are being ordered for a unit, as for a generator, the order is checked also to see that the cost of the parts does not exceed the price of a reconditioned unit. To facilitate installation of brake linings, on which the turnover is rapid, relined brake bands for the different types of trucks are kept on hand. Springs, likewise, have a large demand, and these are painted before being put into stock so they can be used without delay. As a check on uncalled-for repairs, branches are required to return all old parts to the central stockroom, where they are examined to see if they needed replacing.

Most interesting—and no less important—of the many phases of the Borden system of handling ice cream transportation maintenance is the method by which the man behind the desk keeps his fingers on every car. Working under the direction of this individual are three expert inspectors who do nothing but check up on the cars in the branch garages. These men follow no definite routine of inspection



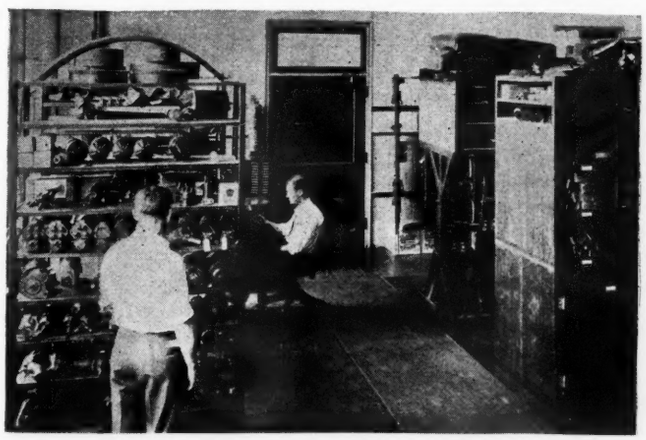


Above, machine shop. Below, gas pump in branch garage, where vehicles are inspected daily. Note gas sheet at left.

but call upon the various branches as the fancy of their boss dictates.

If there be a branch foreman whose pride and ambition do not move him to keep his cars in good condition at all times, the three itinerant inspectors will furnish the needed incentive. For it is the duty of the foreman to have his charges in such trim that they will pass inspection. And to that end, foremen themselves make a complete check of every car in their garages weekly.

The reports of the inspectors to the central office are made on a regular form sheet, and they cover in detail every part inspected. For reporting the condition of the tires a schematic diagram of the axles and wheels is used. The tires are rated on a life of 20,000 miles and numbers from 1 to 10 are employed to indicate the amount of wear left in them. By looking at the diagram with the numbers beside the wheels, the man at the desk can tell at a glance whether the best tires are on the front, or steering, wheels; the second best on the outer rear wheels and the poorest one on the spare carrier, as they should be.



Tiny stockroom that carries the central supply of parts for the Borden ice-cream fleet

The reports compiled by the inspectors are not the only ones that pass over the desk in the central office. Monthly operating cost sheets for each vehicle, breakdown and accident reports by vehicle and by branch, and labor cost cards for work not pertaining to vehicle maintenance are among other information that regularly comes before the head of the motor vehicle department. Unusual incidents also are reported, as, for example, two repair jobs on the same car within a short period. All of these reports are filed for reference.

To keep the records on Borden's fleet of ice-cream cars and trucks in systematic order requires an accounting department. This department compiles the daily reports on each vehicle into monthly and yearly records, allocating the costs to the various phases of operation and maintenance. The complete record of a car for the year is made on a 17x19-in. loose-leaf sheet. The entries on this sheet are made by the month, and in the column for each month are listed the following: gasoline, oil, battery, and tire expenses; operating charges, including license fees, liability insurance, chassis, body and battery depreciation, and rent on electric batteries; fixed charges, including chassis and body repairs and painting; and general and local overhead expense. Then there are total maintenance and total expense, including all the previously mentioned items. In another section are listed repairs, overhauls and accidents; in another, gasoline (gallons), oil (quarts), electric current (ampere hours), mileage, days available, days operated, operated by branch, and operated by department. At the bottom of the sheet are the following: cost per day operated, cost per mile, average miles per day, average miles per gallon of gas, and average miles per quart of oil. At the top of the page the following entries identify the vehicle: year, motor number, chassis number, license number, car number, make and tonnage. The name of the company and branch also are placed at the top of the sheet. To maintain the accounting department that keeps these records costs about $140 weekly, a small figure compared to the savings realized by the information collected.

Probably one of the most difficult decisions asked of the heads of motor vehicle departments is, Shall I junk this car or have it repaired? This is a question that calls for the accounting department's data, including the book value of the truck, its mileage, the type and severity of its service, the manner in which it held up after the last repair job, its up-to-dateness, its operating costs, the cost of the repair job that will put it in good condition, and the cost of replacing it. What could be more foolish than spending $200 to repair a truck that will be worth only $150 after it is repaired?

Another big problem of the fleet owner is what kind of trucks he should buy. From the records of its hundreds of vehicles, the ice cream division of the Borden Co. has solved that problem. It hasn't found any one make of truck superior, but it has learned something about individual parts, such as motors, transmissions and rear systems. As a result, trucks are not ordered by make, but by parts. Every part that goes into the vehicle is specified, and the company from which the purchase is made merely assembles these parts into a unit. Not only does the assembled truck give better service but replacement parts for it are less expensive and may be obtained more readily than those for the truck of a manufacturer's make.

By consolidating the car service facilities of three associated ice-cream companies under one roof, the Borden Co. has made substantial labor savings. In one case the weekly labor cost has been cut from $1,400 to $225; in another, from $900 to $200; and in a third, from a total of $2,600 to $850. Even more important, the number of trucks in operation and the number of spares needed have been significantly reduced. Fewer trucks operate less miles because one truck can often make long-haul deliveries for all three companies. Since the consolidation was effected, no large route trucks have been purchased and some 30 vehicles have been retired from service.

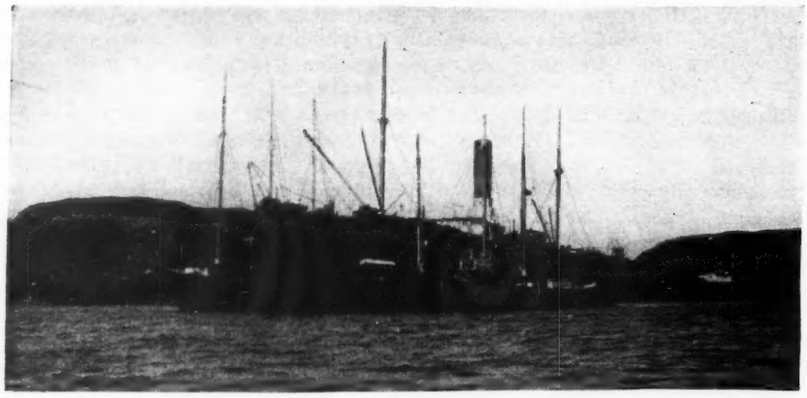
Many savings are made in maintenance costs by eternal watching of details. Some time ago, the man at the desk noticed that grease cups were being purchased by the hundreds, and he knew that at 19 cents each this amounted to money. Consequently, he called a meeting of his foremen and asked them, Why. This "why" brought out the fact that service men were not screwing the caps on properly. They turned them down until they turned hard, but many times that engaged only a few threads and permitted the caps to become unscrewed, and lost, by vibration of the chassis. Since the meeting, the purchase of grease cups has been a rare event.

The most recent innovation in the Borden cut-cost transportation system is an exhaust gas analyzer that tells the complete story about the carburetor and its adjustment. By adjusting or revising the carburetors, savings in fuel of as high as 20 per cent have been effected for some of the trucks. And not only is fuel saved but oil dilution and consequent wear of the motor are reduced. Two inspectors are now checking the carburetor of every car in the Borden ice-cream fleet with this analyzer.

Food manufacturers who think they are doing everything within their power to keep delivery costs down and put their product on a stronger competitive basis might profit by comparing their methods of control and maintenance with those of the ice-cream division of the Borden Co.

Factories Afloat

By HORTON R. PARKER
Nutley, N. J.



Factory ship "Blue Peter" taking salmon from collecting tenders off the coast of Newfoundland

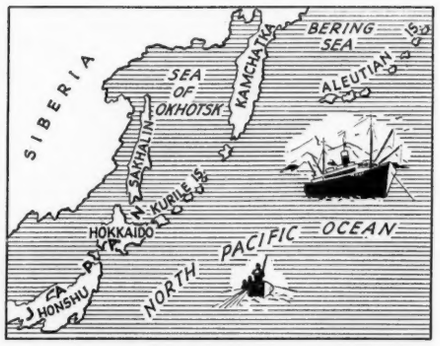
ROMANCE and industry, so often strangers, travel arm in arm aboard the floating factories of commercial fisheries. Away from port for as long as two years at a stretch, these sea-going plants relieve the waters of their raw food materials and return with processed commodities sometimes worth a fortune.

Most fascinating, and perhaps the most dangerous, of the activities in maritime manufacturing are those experienced by whalers. These men, operating from a half dozen small chasers, supply the parent ship with raw materials. After successfully harpooning the whale, they inflate it with compressed air and tow it to the factory. There, a huge door opens in the stern of the ship, and powerful winches pull the carcass up a ramp to the flenzing room. With the whale lying on the highly polished floor, hooks are attached to the blubber and power-operated cranes slowly pull off the strips, the men cutting them free from the flesh by great knives. These strips are then cut into smaller pieces and dropped into steam-jacketed kettles, where the oil is boiled out. Rugged, power-driven saws cut up the bones, and all traces of the carcass are soon removed. The oil goes into heavy tanks below decks and is carried to port to be sold to soap manufacturers. The flesh meal is made into cakes for feeding to cattle, and the residue from the distillation of the flesh and bones—called guano—is dried, disintegrated, mixed with crushed bone and bagged to be sold as fertilizer. Some of these ships handle as many as 25 whales a day, and the processing is carried out rapidly enough to keep almost a continuous procession of the monsters up the ramp.

One of the most modern of these whalers is the "Sir James Clark Ross." Staying eight months in the field, it makes a trip from Norway to the Antarctic and back in about eleven months. A cargo of whale oil that it recently delivered to soap plants in New York was reported to be worth $2,500,000. This represented a cruise of 25,000 miles and a catch of 1,444 whales. The "Sir James Clark Ross" has a displacement of 20,300 tons, is about 550 ft. long, 74 ft. wide and 48 ft. deep, and it carries a crew of 225. Its boiler and extraction system is capable of distilling 150 tons in 24 hours. This modern ship carries an airplane to search out the whales; has a wireless by which it keeps in constant touch with Norway; and is equipped with mechanical ventilation throughout the hold.

Less pretentious but of more importance are the floating factories that produce edible fish products. Of interest among these is the floating factory and cold-storage plant of Job Brothers & Co., Newfoundland, which collects and preserves salmon, halibut and other fish. This ship, the "Blue Peter," has a gross tonnage of 4,132 and was constructed at a cost of $400,000. It is equipped with a modern rapid-freezing process capable of handling 50,000 lb. of salmon in 24 hours and with a sharp-freezing system that has a capacity of 30,000 lb. But the ship is more than a refrigerating plant, for it has modern machinery for canning the fish. And to facilitate loading and unloading frozen products in cases from the various holds, continuous tray elevators are installed in three places on the vessel. The "Blue Peter" is a versatile factory. During the berry season, it turns from fish to fruit and is used to freeze blueberries; at least it was last season. Three thousand of the 30-lb. boxes are frozen in 24 hours by the sharp-freezing process.

To supply the world with much of its canned crabmeat, floating factories from Japan and the Soviet ply the chilly waters of the Pacific Ocean off the far eastern coast of Siberia from April to August each year. From these waters and from Kamchatka comes the bulk of this canned sea delicacy. Until a few years ago the Japanese carried on this industry under concessions from the U.S.S.R. Backed by Russia, the



Where factory ships get bulk of world's crabmeat supply

industry has developed rapidly, and now the Soviet itself operates a dozen completely equipped floating canneries in this region.

These floating crabmeat canneries are 3,000-ton vessels carrying, in addition to the crew, about 450 fishermen and other workmen. They mother eight motor junks which haul the nets and transfer the catch to their parent ship. Besides, they have one or two 30- to 80-ton motorboats which cast nets within a circle of five miles' radius about the factory ship and serve to communicate between it and the junks. As the junks come in with their catch, the nets are hauled upon the after-deck of the factory ship. Then the crabs, weighing 4 to 8 lb. and measuring 3 to 5 ft. from tip to tip, are taken from the nets and boiled in steam kettles on the deck. After boiling, the fish are dipped into the sea and transferred to the upper deck to be cut into pieces. Workmen put the pieces onto sorting tables and classify them as to size to insure the purchaser of getting a uniform product. They then put the meat into parchment-lined enameled tin cans, and these are carried down to the 'tween deck, where they go through the usual cannery process of weighing, sealing and sterilizing. The finished cans are boxed and stored in the holds. Floating canneries of this type can produce about 350 cases per day, each

containing ninety-six ½-lb. cans. In addition, they are equipped to crush, press and cook the shells and waste for recovering the fish oil and for making fish meal. Nothing is wasted.

Seine fishing has been carried on extensively by Japan, and recently the practice has been adopted of dragging the seine between twin motorboats of about 87 gross tons, the boats traveling about 600 yd. apart. On board the vessels are an ammonia refrigerating plant and an insulated refrigerated hold for fish storage. In spite of their smallness, these boats brave the rough seas the year around to carry on their work.

A late development in floating factories is the S.S. "Seapro," which has been equipped in England. Sailing the waters off southwest Africa, this ship will catch all kinds of fish and convert them on the spot into various commercial commodities. A fleet of motorboats will do the actual fishing, and will bring 60 to 100 tons of fish to the mother ship every 24 hours. Some of the fish handled will be fit for nothing except conversion into stock feed; oil will be extracted from others; the livers of some will be used to give medicinal products; and shellfish will be canned for the table. The edible fish will be dryers, the fish meal passes over magnetic rolls which remove any hooks or other small pieces of metal that may remain in it. Next, the product goes through grinders that reduce the bone and other hard particles to a fine powder which is fed directly into bags for the market. The oily fish meal, after drying, is conveyed to a separate set of machinery. There the oil is extracted by organic solvents and is distilled in large evaporators. The cleaned oil is fed directly to drums for market or put into large tanks to be pumped into the buyer's tanks in some port. Besides the equipment for making fish meal and extracting oil, the S. S. "Seapro" is equipped with a cannery of the usual type, and it has a plant for manufacturing the tin cans needed in the cannery.

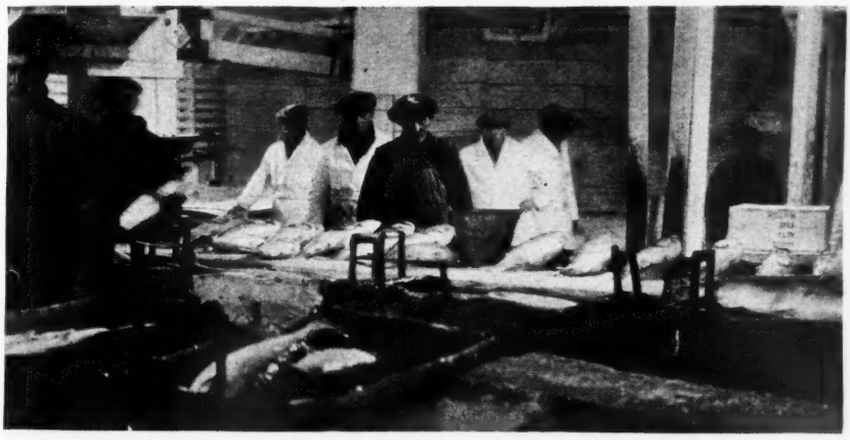
The successful operation of these floating factories during long periods at the fishing banks is in no small part dependent upon modern refrigerating methods and equipment. It is this refrigeration that removes restrictions upon the vessels with their perishable cargoes and permits them to go where the fishing is best and stay there as long as is necessary. Thanks to complete refrigerating equipment, ships serving the Northwestern tuna fisheries are able to cruise over a radius of 9,000 miles.

The equipment of a refrigerated vessel is similar to that in a cold-storage plant on land. The hold of the craft is insulated and the refrigerated space contains long rows of storage racks upon which the fish are stacked. Some of the ships employ quick-freezing processes, and with most of these the fish are dropped into freezing boxes where low-temperature brine circulates about them. As the fish are removed from the bath they are sprayed with water to form a coating of ice and then sent to the storage room.

Another type of freezer, the "Sacip" system, is cylindrical in shape and has several compartments with a capacity of 550 lb. of fish each. The trawlers "Jean Hamonet" and "Marie Helene," of Boulogne, France, have this kind of equipment, and they can stay out for 35 to 40 days. Their freezing capacity is 20 tons a day. On these ships, the fish are cleaned on deck, passed through a hatch into the freezing drum and then put into storage. In preparation for the freezer, they are beheaded, split and disemboweled by machinery.

The "Ser. Gouarne," a 1,450-ton French ship outfitted for Newfoundland fishing, is even better equipped than the "Jean Hamonet" and the "Marie Helene." It has everything they have and, in addition, a plant for converting daily about 8,000 kg. (1 kg. = 2.2 lb.) of waste into 2,000 kg. of fish meal.

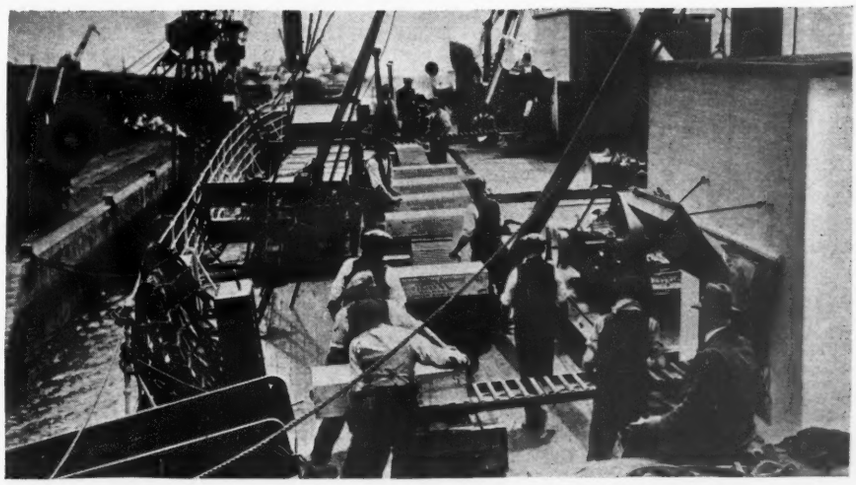
Traveling as it does to the center of its supply of raw material, the floating factory marks a significant development in industrial operations. Nor is it without its counterpart on land, for only this year quick-freezing equipment was moved from region to region to keep pace with the seasons. In both cases, the raw material can be preserved with all its natural qualities only by processing it on the spot.



Above, workmen aboard a floating factory claying and labeling salmon prior to packing them. Below, discharging a cargo of salmon at Southampton, England

put into cold storage and sold whenever the opportunity offers.

In handling fish on this boat, the coarser varieties are hoisted directly upon the deck and dumped into large pulverizing rolls or hacking machines. These take fish the size of a man and tear them into small pieces. After this, the fish are put through a sterilizer and then dropped directly onto large cylindrical dryers. Upon leaving the



This apparently solid mass is mainly air which has been emulsified into a stable foam in cream.

Why Cream Or Egg White Whips

. . . Explained by the Theory of Stable Foams

By OTTO RAHN
Cornell University
Ithaca, N. Y.

IN THE article, "How Eggs Are Dried," by Carl G. Blomberg, in March, 1932, FOOD INDUSTRIES, the editor raises the question: What makes egg white whip to a stable froth? There may be many reasons why one kind of dried egg white will do this and another kind will not, but the general cause of stable froths is well known, and may be of interest, not only to the egg industry but also to users of whipped cream.

All substances producing stable froths contain colloids. Most colloids depress the surface tension of solutions, and to them applies the law of Gibbs and Thomson which states that substances which cause a depression of surface tension will accumulate in the surface. In a gelatin solution, there is more gelatin in the very surface layer than in the center of the solution. This has been shown analytically.

If we make a foam from a peptone solution by beating it with the egg beater, the foam contains more peptone by weight than the solution underneath. If salt is added, the quantity of salt in either the froth or in the solution is the same, but more peptone has accumulated in the froth. Salt does not affect surface tension, and therefore does not concentrate in the foam. (Rahn and Sharp, *Physik der Milchwirtschaft,* Berlin, 1928, p. 4.) The same effect is found in skim-milk foam. There are more solids in the foam than in the skim milk, and the increase is

Table I—Concentration of Peptone in the Foam of a Peptone Sodium Chloride Solution, as Indicated by Total Solids Determinations.

	Total Solids			Salt Content		
	Solution Per Cent	Foam Per Cent	Increase Per Cent	Solution Per Cent	Foam Per Cent	Increase Per Cent
Series I	1.7410	1.8530	0.1120	1.010	1.011	+0.001
	1.6912	1.7945	0.1033	0.995	0.975	—0.020
	1.7524	1.8140	0.0616	1.020	1.034	+0.014
	1.8450	1.9040	0.0590	1.014	1.017	+0.003
	1.7460	1.8147	0.0687	1.024	1.019	—0.005
	1.6990	1.7430	0.0440	1.014	1.010	—0.004
	1.9780	1.9900	0.0120	1.034	1.028	—0.006
Average.....	1.7789	1.8447	0.0658 = 3.7% of total peptone	1.016	1.013	—0.005
Series II	3.4560	3.5670	0.1110	2.034	2.041	+0.007
	3.3567	3.4704	0.1137	2.001	2.011	+0.010
	3.5008	3.6134	0.1126	2.020	2.024	+0.004
	3.4680	3.5340	0.0660	2.014	2.021	+0.007
	3.5009	3.6000	0.0991	1.909	2.000	+0.091
Average.....	3.4565	3.5570	0.1005 = 2.9% of total peptone	1.996	2.019	+0.023

Table II—Composition of Skimmed Milk and Its Foam.

	Average of 9 Experiments with Intensely Foaming Skimmed Milk		Average of 6 Experiments with Slightly Foaming Skimmed Milk	
	Liquid Per Cent	Foam Per Cent	Liquid Per Cent	Foam Per Cent
Protein.....	3.09	3.51	3.01	3.24
Fat and lactose....	4.85	4.73	4.92	4.92
Ash.....	0.75	0.78	0.74	0.76
Total solids...	8.69	9.02	8.67	8.92
Protein increase in foam.....		13.6		7.6

caused by the milk proteins only; sugar and ash do not accumulate.

If protein is concentrated on the surface, it has a tendency to become solid, but all proteins do not behave alike. Some solidify rapidly, others slowly, and some do not solidify at all. Quite often, this solidification is irreversible, and the protein, when put back into the solution, will not dissolve again. This characteristic enabled Hekma and Brouwer to demonstrate the foam substance of milk by means of the microscope, for, when milk foams, solid walls form around the tiny air bubbles; and later, when the foam settles and the air escapes, these solid walls remain as tiny protein bags. Ultimately these tiny bags go into the separator slime when the cream is separated from the milk. A good share of the separator slime consists of just these empty foam walls (see Fig. 1).

In soap suds, however, no irreversible compound is formed. Everything will go back into solution again after the foam breaks down.

There can be little doubt that egg albumin will behave very much like the foam substances just mentioned. It seems, however, that it is not really the albumin itself, but a special kind of protein or a similar compound in the egg which produces the stable foam. This unknown substance is changed irreversibly by drying. The quantity of this compound is so increased by the so-called fermentation process that at least part of it is left after drying. Perhaps the foam compound of fermented eggs is different from the natural one in fresh eggs, but produces the same effect.

The law of Gibbs and Thomson requires that substances reducing surface tension accumulate in the surfaces. In milk, we have several surfaces; there is not only the surface of the foam bubbles but there also is the surface of all the fat droplets, which are so finely divided that their total surface in a quart of milk is about 250 sq.ft. On this surface, too, the foam protein accumulates. Each fat droplet has a very thin membrane of the foam compound, and when fat-splitting bacteria develop in milk, they eat the fat and leave the empty hulls.

When cream is whipped, the foam compound which is around the fat droplets has a tendency to accumulate in the foam surface, and it draws the fat with it. It will become partly solid, and we obtain semi-solid walls of protein with many islands of fat included (Figs. 3 and 4).

Whipped cream probably consists of double walls of the semi-solid foam compound held apart by clumps of fat droplets, as shown in Fig. 2. The watery part of the milk is held there by capillary attraction. The walls cannot collapse because they are braced by the fat droplets. These become entangled in the foam walls by means of their slimy membranes, and in the whipping process the fat collects in the foam, while the liquid draining off is very watery. In a good cream, all this liquid should be incorporated in the foam.

If the whipping or foaming is continued at a suitable temperature, the solid foam walls are finally broken, and the islands of fat stick together, forming butter. All customary churning methods consist in producing a foam by some means or other in which the fat is accumulated.

The flotation process of separating the finally powdered mineral ore from the worthless stone by means of producing a froth is based on a principle similar to the accumulation of fat in whipped cream.

In order to produce a stable foam, a solution must contain a sufficient quantity of a surface-active substance which accumulates in the surface and solidifies there readily.

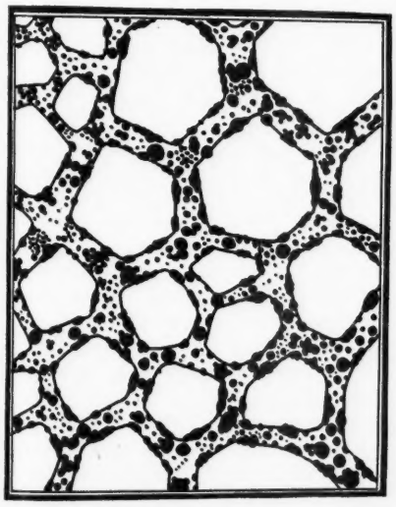


Fig. 2—Diagram of a cross section through whipped cream which, on this page, is magnified 180 times. Fat globules of the cream are shown as small black spots.

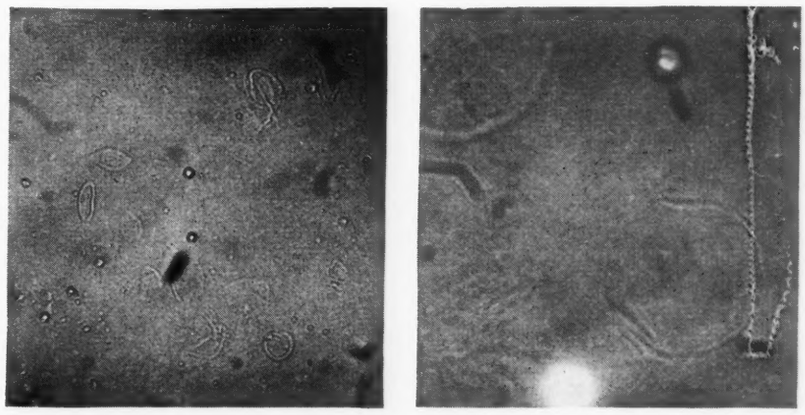


Fig. 1—Residual walls of air bubbles, from skim milk foam from which the air has escaped found in separator slime, are shown here. The picture at the left is 100 times, and at the right is 500 times magnified.

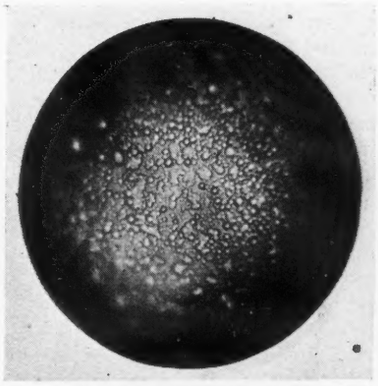


Fig. 3—Microphotograph of a bubble of whipped cream, showing the islands of fat in the solidified foam walls. Compare with Fig. 4.

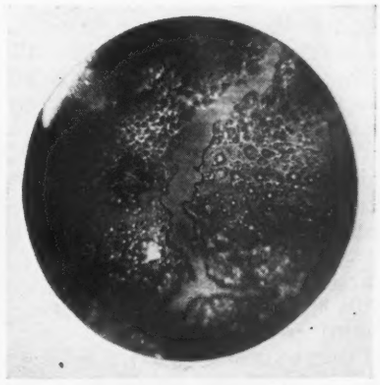
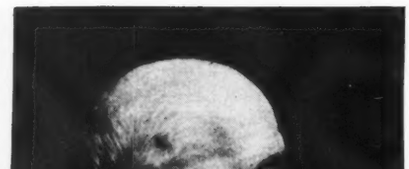


Fig. 4—A few minutes later the bubble in Fig. 3 burst without collapsing, thus proving that the foam walls had solidified.



Barnim F. Ortman, head miller of the George Urban Milling Co., Buffalo, N. Y.

In One Lifetime—

From Buhr Stones To Patent Flour

By W. W. MORROW
Buffalo, N. Y.

LIFE has become so swift that a man is forced to run in order to stay where he is. The spectacle of old industries being revamped almost over night has become so familiar that it no longer excites comment. New industries spring up in the twinkling of an eye. The work a man does today may be made hopelessly obsolete tomorrow through the introduction of some new process or machine.

Of all modern American industries, none has seen greater changes in the last 51 years than the food industries in respect to production, distribution and advertising. Within the food field, no other single industry has seen such striking and revolutionary changes in that time as has flour milling, and had anyone in 1881 predicted as little as a third of the changes that the intervening time has brought to the industry, he would have been considered a psychopath. In the face of such rapidly changing conditions it seems improbable that a person could be an expert under the old methods, live through the various changes, and still be considered as good a miller at 85 years of age as he was at 34. Yet Barnim F. Ortman has done just that. He has been a head miller for 61 years, 51 of which has been spent with the George Urban Milling Co., Buffalo, N. Y., and is still active enough to show that an octogenarian can attain by his own exertions what many sociologists think should be provided for him by the government.

Mr. Ortman began his career as a barrel nailer for the old Island Flour Milling Co., in Minneapolis, Minn., and as far back as 1866 he had the reputation of being a good miller. That was a period when milling was largely a local enterprise and the "jolly old miller" with his long pipe and quaint philosophy of life held forth in the countryside, near the sources of his wheat supply. Most of his early milling career was spent with a Minneapolis company, St. Anthony's Falls, which used buhr stones to grind the wheat. The stones were driven by water power, as they were in all the mills of that time, except where hydraulic power was not readily available. In the latter event, steam was most commonly used, the steam mills being principally in the larger cities. At the same time in some parts of the world, as in Holland, wind was utilized to turn the stones. In more backward countries, animal power was used unless, perchance, labor was particularly cheap and abundant, as in India and China. There human power took the place of animal power. Some or all of these processes were in operation in different sections of the same country.

When he entered the industry, flour mills were referred to in terms of capacity as having "so many run of stone." This method consisted of having an upper stone which rotated over the lower. The wheat was fed into the center of the upper stone and made its way between them through furrows cut in the face of the stone. Centrifugal force thrust the wheat out after it was ground. The bran was separated from the flour by means of a sifter which consisted generally of a wire-covered cylinder within which were brushes to force the flour through the wire mesh, leaving the bran inside. In those days, bran was looked upon as waste material and thrown away. It was not until the middle eighties that bran was recognized as an excellent nutritive feed for animal consumption. Today, bran in some form is used also for human food, and the price of it influences largely the quotation for flour.

Mr. Ortman became an expert in all of the older American methods of making flour from the wheat berry and might reasonably have been expected to continue to make flour as it had been made for centuries. However, in 1881, an industrial revolution took place in milling which was signalized by a milling exhibition held in London, England. This exposition was promoted to show to the millers of the United Kingdom the steel-roller process of grinding and other mechanical advances which indicated to far-sighted millers of the world that flour-milling operations were going to be speeded up.

Although this country cannot justly take credit for originating the roller mill, it can lay claim to improving and utilizing the process on a scale that surpassed the imagination of early millers. The steel-roller process had originated in Hungary. When the idea of adapting the rolls to American flour-milling methods was first suggested, some argued that while they might be suitable for the millers of Hungary, it did not follow that they would be practicable in this country. Others boasted that Europeans adopted the steel-roller mill because they lacked the requisite skill to keep their millstones in proper condition. Some even said that flour would not taste so well in bread if ground on steel instead of stone.

However, there were enough millers in this country, including the late George Urban, Jr., whose father founded the George Urban Milling Co., who saw merit in the new machine and who put forth their energies to use it to their advantage. Not only that but Mr. Urban looked a little further into the future and expressed the opinion that electricity would some day supersede steam and water power. His forecast came true in 1903, when his mill was the first in the country to be driven by electric power.

Mr. Urban was so firmly convinced of the impending changes in flour milling that he cast far and wide for a head miller with the requisite energy, common sense, and adaptability to new

methods. His choice fell on Mr. Ortman, who at that time was employed as head miller in a steam-powered mill in St. Louis. Mr. Ortman went to the Urban mill in Buffalo in 1881, an expert in the old methods of milling, but he resolutely put all he had learned behind him and with his forward-looking employer set to work putting to use in the Urban mill the new improvements which came with such startling rapidity.

During these 51 years, Mr. Ortman has kept young and abreast of the times by looking carefully into every improvement that advanced the art of flour milling. He has witnessed the introduction of the middlings purifier, the separator, the scourer, the washer, the dust collector, conveyors for bringing the wheat from the elevator to the rollers, machinery for weighing and packing the flour, the bleaching process, and the chemical laboratory. His life bridges the gap from the day when flour was handled almost wholly by hand to today, when it is not touched by human hand at any stage of its conversion from wheat to flour. He is still able to put in a full day at the mill, is as active physically as a man half his age and is constantly on the alert for more improvements.

In reviewing his 69 years in the flour-milling industry, particularly in the last 51 years with the Urban company, Mr. Ortman told the writer:

"The miller of today has to exert a far-reaching interest in affairs that formerly did not seem to concern him at all. The miller of old could produce much to suit himself, as there was a ready market. The country was growing and the relatively small production of the average mill was always a little behind demand. Today, all that is changed. The miller has to take an interest in the problems of the farmer and do all he can to improve the quality of the wheat, for the farmer's interest as well as his own. He also has to take a greater interest in the welfare of the baker and give him the kind of flour best suited to his trade. He must follow consumer preferences very closely. When I started in flour milling, the tests for good flour were very simple. If the dough was elastic, the flour was considered good. Today, most flour is purchased on chemical analysis. The miller, too, purchases his wheat from the grain dealer on analysis. There are chemical check-ups all along the line.

"In the old days, one building served for both mill and storehouse. Sacks of wheat were hauled into the mill and piled up, one on top of the other, until the time came to dump their contents into the millstones. When the roller mill and purifier came in and production began to expand by leaps and bounds, millers found they had to build elevators to accommodate the vast quantities of wheat required. This soon turned men's minds to economical methods of transporting wheat from the elevator to the mill, and mechanical conveyors were evolved.

"Under the millstone methods of making flour, the impurities and foreign substances clinging to the wheat were ground up, and it was impossible, with the sifters then in use, to remove all the bran. As a result, the flour had many foreign specks in it and the bran was of a darker shade than today. The middlings purifier, in which the ground flour is sifted through a fine screen of silk cloth to remove the specks of bran, and which came in at about the same time as the steel rollers, has been perfected to such an extent that it is now possible to secure white flour without a speck of bran or foreign substance.

"When the rollers came into wide use, it was believed that this process made cleaning the wheat unnecessary. It was soon discovered, however, that such was not the case, and washers and scourers were developed to give the wheat berry a clean, smooth polish before it goes to the first roller.

"The great difference between the old millstone and the roller mills is that the former reduced the wheat to flour all at one grinding, while the latter does it by successive grindings or reductions. The former did not permit us to refine the flour. Now, after the first run through the rolls, the wheat is conveyed to a separator where it is divided according to the degree of fineness, and these parts are again run through the rolls until all of the bran, which forms the outer coating of the wheat berry, is removed, and the flour content is reduced to the required granulation. From the rolls, the flour is carried to the purifier which makes the 'patent' flour. The word 'patent' is confusing to many people not acquainted with flour milling. It simply means flour made by the patent process, the roller mill and purifier, and represents the highest grade."

Some idea of the vast changes that Mr. Ortman has witnessed since he began his service with the Urban Milling Co., on the eve of the milling revolution, can be gained from a glance at the census figures, which show that in 1889, when the roller mill became quite generally adopted, there were 18,470 flour mills. In 1929, there were only 4,022 mills having an annual production valued at as much as $5,000. Without a doubt far the major portion of the 14,448 mills unaccounted for found the pace too fast and either failed to keep step with developments or dropped out for other reasons. In 1889, the 18,470 mills then in operation produced 80,949,000 bbl. of flour. In 1929, only 4,022 mills produced 120,039,673 bbl. of flour, or 39,090,673 bbl. more than their more numerous predecessors of 30 years previous.

Present-day plant of the George Urban Milling Co.

Charting the Trends in the Dairy Products Industries

By R. S. McBRIDE
Assistant Editor
Food Industries

MILK and milk products are of outstanding importance to agriculture, in transportation, as raw materials of food processing, and as a part of the American diet. It is important, therefore, to gage the trends of production, stocks on hand, consumption and prices of this important group of foods. Obviously, no single index, nor even a small group of national indexes, will serve for this purpose. The economic and trade problems of the industry are too complex to permit simple analysis. But, all the more because of this fact, it is important that the basic factors affecting all branches of the industry be better understood by every division of the food business.

To understand milk and milk-products economics one must consider many inter-industry relationships as well as the question of factors in determining the total production and national supply. First of all, one must understand the considerations which determine the flow of milk from the source into the different uses or industrial applications. When one understands these factors he can then better appraise the problems of local importance or of an individual industry.

Usually fluid-milk sheds must be considered individually, because in two adjoining areas quite different conditions may prevail, either because of unusual climatic or other economic influences. It is not sufficient to consider the national milk problem alone. In fact, there are different problems simultaneously presented in the various territorial divisions of the industry, each milk shed having its own distinctive characteristics.

Normally, a milk shed is defined as the area within which milk flows under economic influence to a single market or to a small group of market centers. The boundaries between adjoining milk sheds are determined largely by the relative demands for fluid milk in the various metropolitan areas served; and prices are limited by the considerations of freight rates, market demand and contemporary competitive supply. Defined purely on economic grounds, one would say that along the common border of two adjacent milk sheds the price of fluid milk for city supply, normally, is about equal, whether the milk moves to one center or to another center located in some different direction. Along this border line the price for fluid milk to be used in city supply usually is about equal to the price paid by manufacturers who propose to use the milk for the production of cheese, evaporated or dried milk, butter or ice cream. With any change in freight rate or any notable change in supply or market conditions, the outline of the particular milk shed moves in order to secure a new equilibrium between adjoining areas or between competitive uses.

In some few instances, arbitrary man-made considerations may define a milk shed. For example, the health regulations of a community, such as the New

Dairy Products Manufactured During 1930 in the United States

Manufactured product	Number factories reporting	Thousands of pounds
Creamery butter	4,177	1,595,231
Whey butter (made from whey cream)	174	2,516
Renovated or process butter	5	1,850
American cheese:		
Whole milk	2,297	378,816
Part skim	31	3,653
Full skim	20	669
Swiss cheese (including block)	282	26,393
Brick and Münster cheese	368	33,548
Limburger cheese	94	8,473
Cream and Neufchatel cheese	58	33,213
All Italian varieties	80	8,573
All other varieties	71	7,029
Cottage, pot, and bakers' cheese	873	97,641
Condensed milk (sweetened):		
Case goods:		
Skimmed	6	2,092
Unskimmed	28	121,626
Bulk goods:		
Skimmed	159	158,971
Unskimmed	79	62,421
Total, condensed milk	....	345,110
Evaporated milk (unsweetened):		
Case goods:		
Skimmed	6	1,650
Unskimmed	140	1,449,149
Bulk goods:		
Skimmed	209	156,212
Unskimmed	110	128,203
Total, evaporated milk	....	1,735,214
Concentrated skim milk (for animal feed)	42	23,152
Condensed or evaporated buttermilk (including concentrated product)	93	96,431
Dried or powdered buttermilk	322	64,601
Powdered whole milk	35	15,440
Powdered skim milk	317	260,675
Powdered cream	7	400
Dried casein (skim milk or buttermilk product)	316	41,965
Malted milk	10	22,691
Milk sugar (crude)	15	12,779
Ice cream (all kinds) gallons	3,583	240,750

Whole Milk Required for Manufactured Products

Manufactured Products	Whole Milk Required per unit of product *Pounds*	Quantity of Product Manufactured *Pounds*	Whole Milk Required *Pounds*	Per Cent of Milk Manufactured
Creamery butter	21.0	1,595,231,000	33,499,851,000	55.066
Farm butter (preliminary)	21.0	570,000,000	11,970,000,000	19.676
Cheese (all kinds)	10.0	500,367,000	5,003,670,000	8.225
Condensed and Evaporated milk	2.5	2,080,324,000	5,200,810,000	8.549
Powdered milk	8.0	15,440,000	123,520,000	.203
Powdered cream	19.0	400,000	7,600,000	.012
Malted milk	2.2	22,691,000	49,920,200	.082
Milk chocolate			226,858,000	.373
Ice cream (gallons)	13.75	345,714,000	4,753,568,000	7.814
Total whole milk required			60,835,797,200	100.00

Annual per Capita Consumption of Dairy Products

(Data from Bureau of Agricultural Economics except as noted)

Year	Milk[1] Gallons	Butter[2] Pounds	Cheese[3] Pounds	Condensed and Evaporated Milk Pounds		Ice Cream Gallons[4]
1849	.....	13.9	4.0	.....		....
1859	.....	15.1	3.2	.....		....
1869	.....	13.7	3.3	.....		....
1879	.....	15.8	2.1	.....		....
1889	.....	19.5	2.9	.....		....
1899	.....	19.9	3.7	.....		....
1909	.....	18.0	3.85[5]	.....		1.04[6]
1914	.....	17.0	4.60[5]	.....		1.68
1916	.....	15.4	3.04	.....		2.08
1917	42.4	14.6	2.89	10.49		2.07
1918	43.0	14.0	3.00	12.50		2.14
1919	43.0	14.8	3.50	12.30		2.49
1920	43.0	14.7	3.50	10.17		2.46
1921	49.0	16.1	3.50	11.40		2.28
1922	50.0	16.5	3.70	12.69		2.43
1923	53.0	17.0	3.90	13.25		2.68
1924	54.75	17.38	4.20	14.0		2.50
1925	54.75	17.39	4.26	Cond. 14.87	Evap.	2.80
1926	55.30	17.82	4.36	2.75	11.56	2.77
1927	55.8[7]	17.62	4.14	2.60	11.59	2.85
1928	56.8[7]	17.34	4.11	2.56	12.50	2.90
1929	57.1[7]	17.61	4.62	2.75	13.83	3.00
1930	56.9[7]	17.75	4.71	2.66	13.95	2.82

[1] Includes both fluid milk and fluid cream.
[2] Includes both farm and factory butter.
[3] Includes all kinds of cheese except cottage.
[4] Includes both factory and home made.
[5] Includes cottage cheese.
[6] For the year 1910.
[7] Data of R. G. Dun & Co.

York City requirement regarding dairy inspection, may delimit the supply areas more or less independently of pure economic factors.

Fluid milk requirements are in general adequately met within any milk shed before any other milk applications receive serious consideration. This is because the fluid-milk market can pay slightly more for raw milk than any other group. Speaking nationally, about 45 per cent of the country's milk supply is used as fluid milk, which includes fluid cream. Such market is more or less independent of changing conditions and is generally the most stable of all of the dairy products' markets. As will be shown later, the total quantity of fluid milk used varies somewhat with the purchasing power, but this variation is much less and the price charged for fluid milk at retail varies much less than do the demands and the prices for most other dairy products.

The quantity of milk used for some of the major milk products, such as cheese, condensed and evaporated milk, dried milk and miscellaneous manufactured goods, is largely determined by the magnitude of the expected markets for these products. None of this group of products is highly perishable; in fact most of them are normally kept after manufacture several months, or even in some cases as much as 1 to 1½ years. In striking contrast with the first group is a second class of products, like ice cream, for which the demand of the immediate future—days or, at most, weeks ahead—governs production. Frozen cream is of longer life than ice cream, but usually is held for shorter periods than butter or cheese. In the case of ice cream particularly, weather conditions are of outstanding importance in producing short-time fluctuations. Largely and more easily anticipated variations naturally occur in a seasonal cycle.

Substantially all of the milk not used in the fluid milk market nor required for the manufacture of the products just named finds its way into butter manufacture. Thus the butter business is the balance wheel of dairy products activities. It absorbs not alone the surplus of fluid milk in any area but also the surplus of frozen cream; and it provides a reserve from which raw material for making ice cream can be produced an abnormal but occasionally an important movement of local significance.

Farm conditions to some extent determine the usage of a part of the annual production. Several per cent of the total milk supply is used on the farm, primarily for feeding calves to the stage of marketable veal and to a lesser extent for other livestock feeding. The relative market price for milk and the prospective market for veal animals, as well as the available number of calves, determine the magnitude of this consumption of milk at any particular season in any particular milk shed.

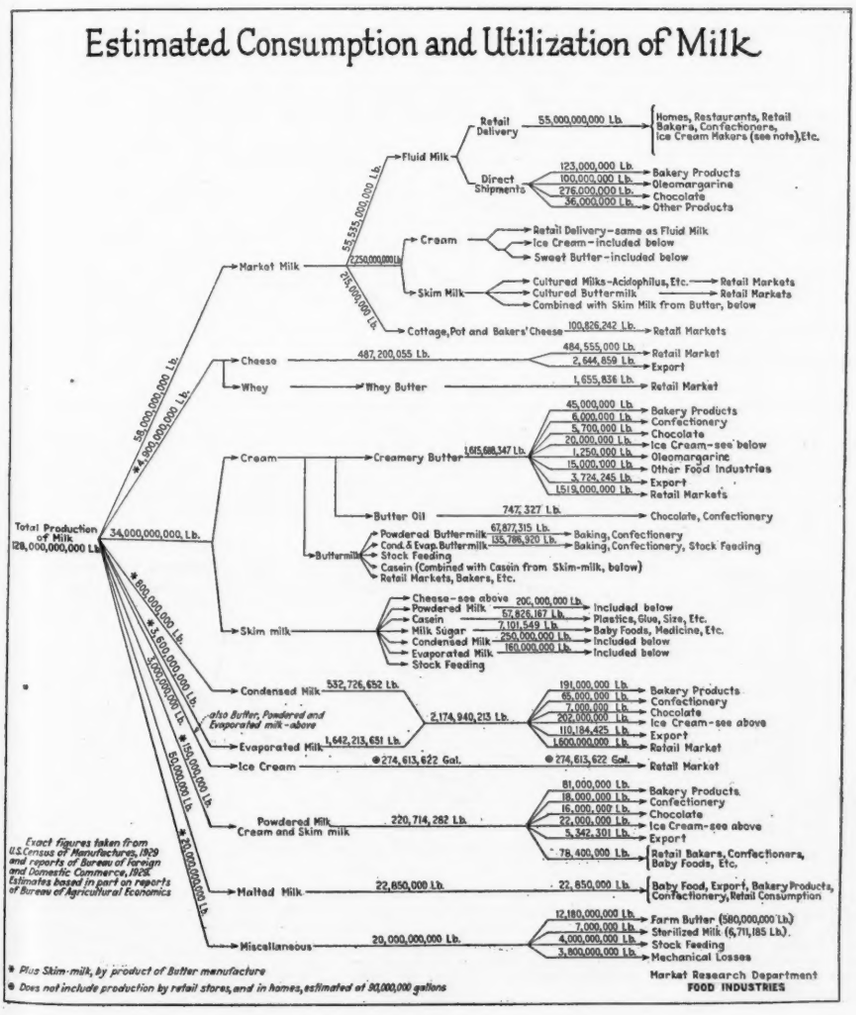
A more important farm factor, which affects product rather than usage, is the relative price of feed, or the quantities locally available, and the prevailing market price for milk. In Chart 5 is shown on a comparable scale the market prices for butter in comparison with the cost of feed required to produce the milk equivalent of a pound of butter. Over a considerable period, from 1922 to 1928, the butter price was approximately double the equivalent feed price. And during that interval there was a "margin" of about 20 cents a pound or more to compensate the farmer for other costs of production than feed.

In 1931, the prevailing price of butter was frequently much less than twice the feed price and the difference was less than 15 cents. Hence the margin from this ultimate surplus milk-products market (butter manufacture) afforded much less opportunity for profit to the farmer than before. One might have expected that this would quickly react to occasion a lowered production of milk. And all other conditions being equal, it undoubtedly would have done so. But the study of this problem brings out another set of factors affecting the industry as a whole: those which center around cow population.

Cow population, of course, largely affects the total milk production, save as the slow trend to higher production per cow is accomplished by gradual herd improvement. Fortunately, this factor can be gaged over considerable periods in advance. But here again the national situation must not be considered alone; each milk shed must be studied separately, especially by the single manufacturer interested only in the milk supply of a relatively small geographic area.

The recent history of cow population and the effect on it of heifer and heifer-calf numbers is shown in Chart 1. One must, however, study these trend curves in their relationship to the other curves of cow and heifer slaughter in contemporary periods (Chart 2). By noting the latter curve and the definite downward trend in the average annual slaughter, one can see why during the past four years there has been a strong upward trend of total milch-cow numbers. The reason for declining slaughter is not difficult to find. This decline in cow slaughter clearly represents a reduction in rate of culling of herds, a result of the low market price for beef on the hoof.

At the present time it is evident that the value of a cow delivered at a


Estimated Consumption and Utilization of Milk
Total Production of Milk 128,000,000,000 Lb.
34,000,000,000 Lb.
58,000,000,000 Lb.
*4,900,000,000 Lb.
*850,000,000 Lb.
*3,400,000,000 Lb.
1,000,000,000 Lb.
*150,000,000 Lb.
850,000,000 Lb.
*200,000,000 Lb.
Market Milk
55,535,000,000 Lb.
7,250,000,000 Lb.
715,000,000 Lb.
Fluid Milk
Retail Delivery 55,000,000,000 Lb.
Homes, Restaurants, Retail Bakers, Confectioners, Ice Cream Makers (see note), Etc.
Direct Shipments
123,000,000 Lb. Bakery Products
100,000,000 Lb. Oleomargarine
276,000,000 Lb. Chocolate
36,000,000 Lb. Other Products
Cream
Retail Delivery—same as Fluid Milk
Ice Cream—included below
Sweet Butter—included below
Skim Milk
Cultured Milks—Acidophilus, Etc. → Retail Markets
Cultured Buttermilk → Retail Markets
Combined with Skim Milk from Butter, below
Cottage, Pot and Bakers' Cheese 100,826,242 Lb. → Retail Markets
Cheese 487,200,055 Lb.
484,555,000 Lb. Retail Market
2,644,859 Lb. Export
Whey
Whey Butter 1,655,836 Lb. Retail Market
Cream
Creamery Butter 1,615,688,347 Lb.
45,000,000 Lb. Bakery Products
6,000,000 Lb. Confectionery
5,700,000 Lb. Chocolate
20,000,000 Lb. Ice Cream—see below
1,250,000 Lb. Oleomargarine
15,000,000 Lb. Other Food Industries
3,724,245 Lb. Export
1,519,000,000 Lb. Retail Markets
Butter Oil 747,327 Lb. Chocolate, Confectionery
Buttermilk
Powdered Buttermilk 67,877,315 Lb.
Cond. & Evap. Buttermilk 155,786,920 Lb.
Baking, Confectionery
Baking, Confectionery, Stock Feeding
Stock Feeding
Casein (Combined with Casein from Skim-milk, below)
Retail Markets, Bakers, Etc.
Skim milk
Cheese—see above 200,000,000 Lb.
Powdered Milk 57,826,187 Lb. Included below
Casein 7,101,549 Lb. Plastics, Glue, Size, Etc.
Milk Sugar 250,000,000 Lb. Baby Foods, Medicine, Etc.
Condensed Milk 160,000,000 Lb. Included below
Evaporated Milk Included below
Stock Feeding
Condensed Milk 532,726,652 Lb.
also Butter, Powdered and Evaporated milk—above
2,174,940,213 Lb.
191,000,000 Lb. Bakery Products
65,000,000 Lb. Confectionery
7,000,000 Lb. Chocolate
202,000,000 Lb. Ice Cream—see above
110,184,425 Lb. Export
1,600,000,000 Lb. Retail Market
Evaporated Milk 1,642,213,631 Lb.
Ice Cream *274,613,622 Gal. *274,613,622 Gal. Retail Market
Powdered Milk
Cream and Skim milk 220,714,282 Lb.
81,000,000 Lb. Bakery Products
18,000,000 Lb. Confectionery
16,000,000 Lb. Chocolate
22,000,000 Lb. Ice Cream—see above
5,342,301 Lb. Export
78,400,000 Lb. Retail Bakers, Confectioners, Baby Foods, Etc.
Malted Milk 22,850,000 Lb. 22,850,000 Lb. Baby Food, Export, Bakery Products, Confectionery, Retail Consumption
Miscellaneous 20,000,000,000 Lb.
12,180,000,000 Lb. Farm Butter (580,000,000 Lb.)
7,000,000 Lb. Sterilized Milk (6,711,185 Lb.)
4,000,000,000 Lb. Stock Feeding
3,800,000,000 Lb. Mechanical Losses
Exact figures taken from U.S. Census of Manufactures, 1929 and reports of Bureau of Foreign and Domestic Commerce, 1928. Estimates based in part on reports of Bureau of Agricultural Economics
* Plus Skim-milk, by product of Butter manufacture
• Does not include production by retail stores, and in homes, estimated at 80,000,000 gallons
Market Research Department
FOOD INDUSTRIES

slaughter-house center is so low that the bulk of this value is consumed in freight for delivery of the cow in the packing-house yard. Some farmers have found that the net return to themselves is only one or two dollars per animal, if they undertake to ship their less productive animals. Hence, especially if they have ample feed supply or good pasturage, they find even a small milk production is worth more to themselves than this almost negligible return from the sale of the animals. Perhaps the best index for gaging the probability of slaughter lies in the ratio between the local market price for beef on the hoof to the prevailing value of feed in the same market. In any event, that relationship must be carefully considered when the probable trend in cow population is being studied for any specific milk shed.

It must always be borne in mind that current cash income, either from the sale of cull cows or from the sale of milk, may at times be more important to the individual farmer than other delayed profits of larger size. Normally, the cash income from milk is an outstanding part of the total cash income of the farmer, especially in important dairy states. This fact is further demonstrated by the experience in many markets where the quantity of milk shipped per farmer increases very definitely whenever the ratio of the price of milk to the price of grain increases above normal. This ratio between milk price and grain price, however, is more significant in winter seasons than during good pasture periods, and more important in states where feed is purchased than in other states where most dairymen raise their own feed.

Price trends are the most important of all trends. Unfortunately, of all characteristics, they are most difficult to forecast. There are, however, a few clear generalizations of interrelationship that can be set up. Because of limited space these must be more or less categorically summarized.

1. Fluid milk prices, especially the price for fluid milk at retail to the householder, varies less than the prices of any other dairy products under normal conditions. This in part results from the fact that fluid milk consumption changes less with changing price than does the consumption of any other milk product. The retail dairyman has less inducement to lower prices in an effort to stimulate consumption than has the retailer of any other dairy product. It is also well recognized that retail price changes tend to disturb customer relations; they are, therefore, made as infrequently as possible by most dealers.

2. Butter prices perhaps fluctuate more widely than do the prices of any of the longer-lived milk products, such as cheese, or condensed and evaporated milk, or even the short-lived ice cream. Also it is interesting to know how the per capita consumption of oleomargarine varies almost precisely in comformity with the variation of butter price (Chart 4).

3. Butter prices appear to depend more on the purchasing power of the population than on any factor within the dairy industry. Superimposing the index number of national payrolls (Federal Reserve Board) on the butter price chart (Chart 3), also in index numbers, one finds a close conformity, with only slightly wider and more frequently small swings in the butter price than in the payroll index.

4. Prices for cheese depend in some measure upon the purchasing power of the population, but also largely upon the relative stocks on hand and stocks of competitive protein materials, such as fish, poultry, and eggs. The market price of these competitive materials is superimposed as a special influence on the general influence which dominates all food prices: that of average price level for all goods. During the last few years this latter major economic factor has perhaps been more dominant than the specialized factors of inter-protein competition.

5. The fluid-milk retail market price is closely interlocked with the price received by the farmer for his milk. It has less influence on the price charged for milk used in manufacturing opera-

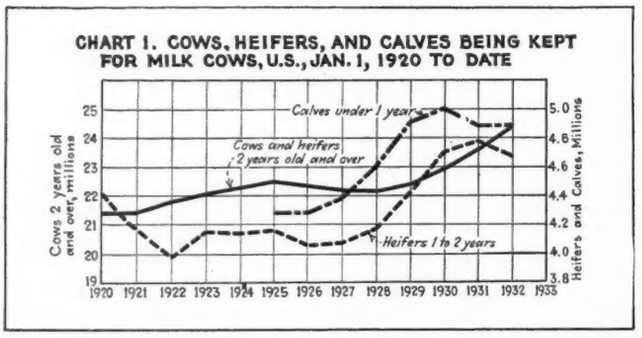


CHART 1. COWS, HEIFERS, AND CALVES BEING KEPT FOR MILK COWS, U.S., JAN. 1, 1920 TO DATE
Calves under 1 year
Cows and heifers 2 years old and over
Heifers 1 to 2 years
Cows 2 years old and over, millions
Heifers and Calves, Millions
1920 1921 1922 1923 1924 1925 1926 1927 1928 1929 1930 1931 1932 1933

Increase in the price of milch cows after 1925 caused the number of heifer calves kept for milch cows to be sharply increased above normal replacement requirements. With culling low, this has caused the number of milch cows to increase 10 per cent during the last 4 years, and the number of cows 2 years old and over kept for milk now on farms is at a very high level.

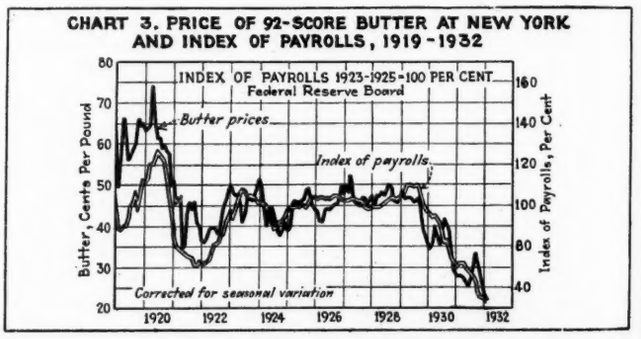


CHART 3. PRICE OF 92-SCORE BUTTER AT NEW YORK AND INDEX OF PAYROLLS, 1919-1932
INDEX OF PAYROLLS 1923-1925=100 PER CENT
Federal Reserve Board
Butter prices
Index of payrolls
Corrected for seasonal variation
Butter, Cents Per Pound
Index of Payrolls, Per Cent
1920 1922 1924 1926 1928 1930 1932

Consumer purchasing power as reflected by payrolls is an important factor in butter prices. Short-time variations in butter prices are caused by other factors, such as seasonal variations in supply, and by storage demand. In 1930, unusually large storage stocks depressed prices until the drought greatly decreased production, and storage stocks were consumed.

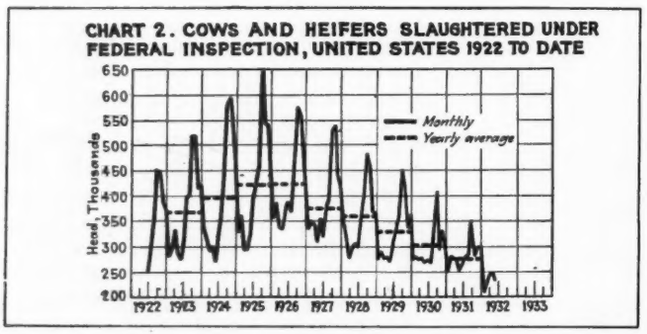


CHART 2. COWS AND HEIFERS SLAUGHTERED UNDER FEDERAL INSPECTION, UNITED STATES 1922 TO DATE
Monthly
Yearly average
Head, Thousands
1922 1923 1924 1925 1926 1927 1928 1929 1930 1931 1932 1933

Decrease in number of cows slaughtered accounts for much of the increase in the number of milch cows on farms during the last few years. Above three-fourths of the cows in the country are milch cows and about that proportion of the total cow slaughter is under federal inspection. Thus the record of inspected slaughter serves to indicate important changes in the number of milch cows being culled from herds.

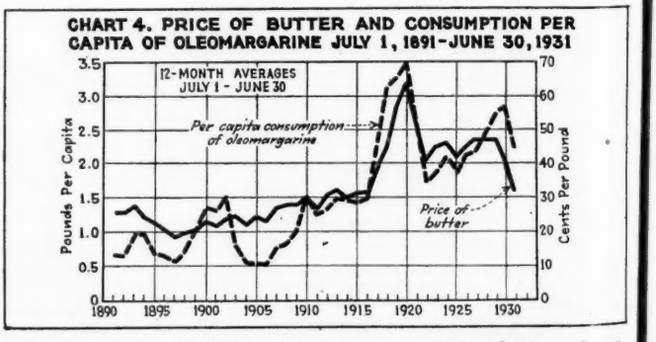


CHART 4. PRICE OF BUTTER AND CONSUMPTION PER CAPITA OF OLEOMARGARINE JULY 1, 1891-JUNE 30, 1931
12-MONTH AVERAGES JULY 1 - JUNE 30
Per capita consumption of oleomargarine
Price of butter
Pounds Per Capita
Cents Per Pound
1890 1895 1900 1905 1910 1915 1920 1925 1930

When butter is relatively high in price, certain classes of consumers buy oleomargarine in place of butter. Hence the per capita consumption of oleomargarine rises and falls much as does the price of butter. In recent years the production of oleomargarine has been about 20 per cent of the production of creamery butter in the United States, in spite of the specific tax burdens that oleomargarine has to carry.

tions. The farm price in recent years in most major city markets has been more largely determined by the completeness of the organization of the milk producers and the skill in bargaining of their organization representatives than by any other single factor. However, when highly competitive conditions prevail, such as those now evident during a period of restricted business activity, the dominance of the milk producers' organization is less evident, because broad economic factors intervene to upset all other considerations to a material degree.

6. Prices for one or more milk products may for a short time or in a limited area be abnormal in their ratios to the other prices, but such disparity usually cannot continue long nor over a wide area. The free flow of raw milk under the pressure of market competition into one or another usage is likely to readjust price ratios to substantial equivalents unless some unusual or artificial factor is injected. A permanent or large change in the relationship between the average prices for different milk products comes about but slowly and is the result generally of either a changing dietary habit or a radical change in the efficiency or the cost of manufacturing in one or another division of the dairy industries.

From the standpoint of all parties interested in the dairy business—farmer, milk-product manufacturer, and retail distributor—it is encouraging to know that apparently the per capita production and consumption of milk is increasing. Some have erroneously drawn the contrary conclusion by comparing the rate of increase in population with the lower percentage increase in number of cattle being milked. Those who do so have neglected the important influence on milk production of the superior qualities of cows now maintained in dairy herds. If one corrects cow numbers by applying the increased milk productivity per cow indicated from census returns, he finds that during the past decade there has been a greater increase in milk production and consumption than corresponds to the current increase in population, all measured in terms of total milk and milk products used.

The increase in per capita consumption of milk is even more striking if one refers to the direct use of fluid milk and fluid cream in the household or in institutional applications analogous to household use. The tendency toward lessened use of milk during a period of restricted buying power has been more than offset by other factors, presumably in considerable measure by lowered price, so that today the apparent per capita fluid milk consumption has not declined significantly below the average of the years of greatest commercial prosperity.

Generalizations regarding milk or milk-products trends are always dangerous. They are doubly so under conditions like those of the present. This, however, does not justify any individual firm which buys or sells substantial quantities of dairy products in failure to make the most careful possible estimates regarding factors affecting its particular commodity or its particular milk-market area. In addition to the many broad principles which have been referred to in this brief article, there are scores of detailed or local considerations which must be taken into account. And then, as one of the most skilled economists in the industry recently said, "One studies all the indexes and, on the basis of his experience, then must merely use his own best judgment."

One might think that under these circumstances it is futile to study dairy-products problems in an economic sense. That conclusion, however, is really not justified. The application of such studies to individual company tasks will not be easy. But the management which today is looking for an easy job in its industrial programming probably will be soon out of a job altogether.

FOOD INDUSTRIES and the author of this article take pleasure in acknowledging the cooperation afforded by E. W. Gaumnitz and T. R. Pirtle, of the Division of Dairy and Poultry Statistics, Bureau of Agricultural Economics, and the data and charts which have been prepared by them and their associates of that bureau.

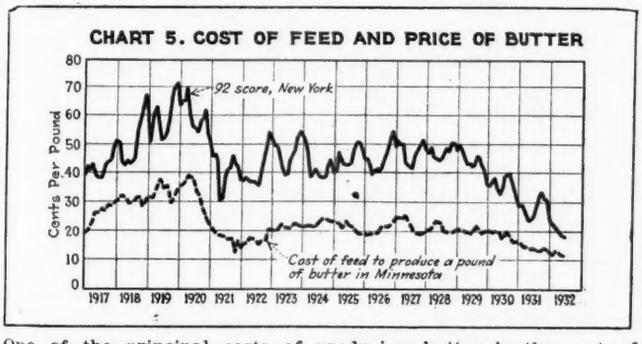


CHART 5. COST OF FEED AND PRICE OF BUTTER
Cents Per Pound
92 score, New York
Cost of feed to produce a pound of butter in Minnesota
1917 1918 1919 1920 1921 1922 1923 1924 1925 1926 1927 1928 1929 1930 1931 1932

One of the principal costs of producing butter is the cost of feed for the milch cows. Through a period of years the trend in the price of butter is similar to the trend in feed costs. The price of butter changes greatly from one season to another, but feed costs are more stable. [Feed ration used; hay, clover or mixed, 18 lb.; corn, 3 lb.; oats, 2 lb.; cottonseed meal (43 per cent), 1 lb.; and bran (standard), 1 lb.]

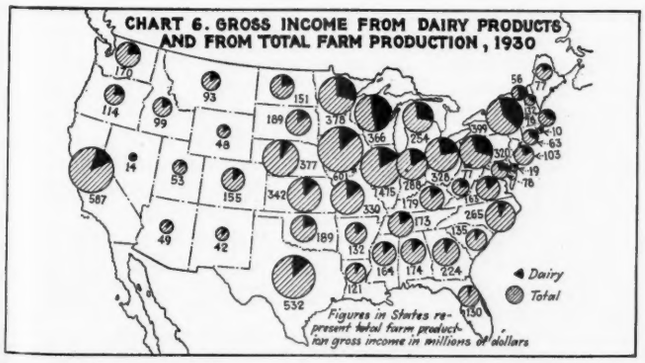


CHART 6. GROSS INCOME FROM DAIRY PRODUCTS AND FROM TOTAL FARM PRODUCTION, 1930
Dairy
Total
Figures in States represent total farm production gross income in millions of dollars

In Vermont, Wisconsin and New York, nearly half of the gross income of the farmers in 1930 was obtained from milk. In a dozen other states milk was the largest source of gross income. The shaded circles show how the gross incomes of farmers in the various states compared.

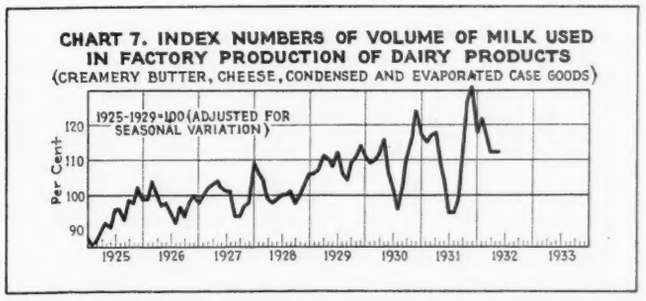
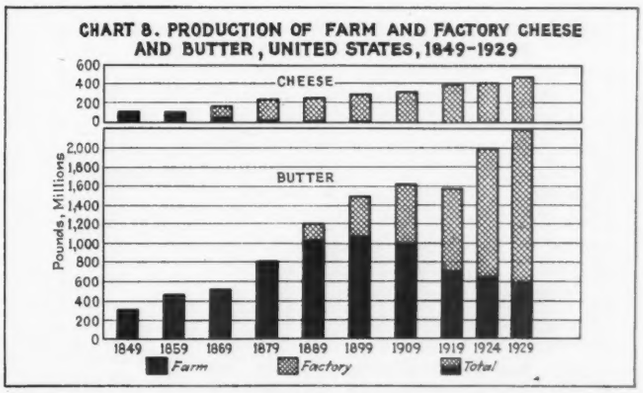


CHART 7. INDEX NUMBERS OF VOLUME OF MILK USED IN FACTORY PRODUCTION OF DAIRY PRODUCTS
(CREAMERY BUTTER, CHEESE, CONDENSED AND EVAPORATED CASE GOODS)
1925-1929=100 (ADJUSTED FOR SEASONAL VARIATION)
Per Cent
1925 1926 1927 1928 1929 1930 1931 1932 1933

Volume of milk used in factory production fluctuates more violently than production per cow because of changes in the numbers of cows milked and because factory production is in part the surplus over the quantity used on farms and for fluid use. Production was high during the winters of 1930-31 and 1931-32 but low during the summer months of 1930 and 1931.



Total production of farm and factory butter in the United States in 1929 was about 2.2 billion lb., of which about 1.6 billion lb. was made in butter factories and 600 million lb. made on farms. In 1899 about two-thirds of all butter was made on farms, but since that time farm butter making has declined, and factory butter making has increased greatly. Since 1869 only a small percentage of total cheese production has been made on farms.

Setting Up Wage Incentives In Small Industries*

By STEWART M. LOWRY
Industrial Engineer,
Procter & Gamble Co.,
Ivorydale, Ohio

Mechanical operations such as filling, wrapping, and packing Crisco readily lend themselves to wage incentives.

"IT MIGHT be all right for the other fellow, but, you see, our business is different. We have no repetition; no quantity orders. Today's job may not be repeated for six months, or six years, or never."

How often have executives of smaller companies thus put off considering the fundamental principles of scientific management! In some instances these executives may be too self-satisfied, perhaps too short-sighted, to learn much about wage incentives. More often, I believe, their thinking is dominated by the idea that "standardized mass production"—the symbol of so-called "Big Business"—has made possible many things thought to be impossible—at least impracticable—in the smaller industries. This conviction is expressed in their fatalistic plea, "We have no repetition; no quantity orders. We must accept our fate and labor under the handicap of diversification."

My answer is, "No repetition? No repetition of what? Exactly the same orders? True! but plenty of repetition of motions and cycles and operations." Frank Gilbreth found years ago that there are only seventeen different hand motions, and they are repeated millions of times daily in small industries just as they are in large industries. The workers in small industries walk and stoop and lift and pull and push just the same as in large industries. Perhaps not always in a fixed order of sequence, which might make the problem a little more complicated but not fundamentally different. The variation is largely a matter of details; small industry does possess the advantage of greater flexibility and a capacity for speedier adjustment to changing conditions.

The pertinent question is, What is the real purpose of incentive plans? A popular, but narrow, conception is that they are devices solely for the reduction of manufacturing costs; that they induce workers to increase their output in a given time through additional effort for a share in the resulting savings. There is a deeper purpose.

Manual workers have physical energy for sale. As with commodities, there should be a method of measuring its value. Fixed rates of pay for given periods of time, such as per day or hour, have proved inadequate. Obviously, there are differences in individuals, and the effective performance of one man in a given time can be very different from that of another man on the same job. The man with more highly developed skill, greater physical stamina and more diligent application can, and usually will, accomplish more than a man with lesser qualifications. Therefore, his services are of more value to his employer and he should receive greater compensation.

These differences in physical performance can be given a quantitative (even qualitative) value. Time and motion study permits the establishment of standards of normal or reasonable performance, in terms of a common and understandable unit of measure, such as "standard hours of work." The relation of each individual's actual performance to this standard accurately classifies him.

Failure of the worker to produce a fair day's work, or of management to compensate properly for more than a fair day's work is largely due (disregarding sheer laziness, on the one hand, and excessive greediness for profits, on the other) to the absence of an established criteria of what constitutes a "fair day's work." The desire for fairness is the true purpose of incentives. Few workers resent working to a fair standard when they know extra performance means extra compensation, and few employers expect unreasonable performance for the base wage or are reluctant to compensate adequately for performance in excess of a fair day's work. Thus, the major objectives of both sides are realized and an economic need is satisfied.

For a number of years, I have thought of incentive work as having five functional divisions which I shall characterize by: analysis, standardization, measurement, compensation, and control.

The word "analysis" implies knowing what we have at hand with which to start. It means the collecting and studying of all of the available facts. This collection should be done in an orderly way—not haphazardly—if one is to be sure that nothing of importance is overlooked and if one is to obtain quickly an understanding of the problem and to proceed intelligently with its solution.

A good wage incentive engineer will not start making time studies the first day on a new job. He will first make a preliminary survey, the thoroughness of which will depend upon the possible savings and upon the urgency for completion of the application. Some of the questions to which he should secure answers are as follows:

Operations—What are the major operations and in what sequence are they performed? How does the department as a whole fit into the entire plant or process? A flow chart is useful in visualizing the picture.

Equipment—List all machinery and equipment, with capacities, speeds and ranges of application. Is it modern and in good condition? Consider the layout and the flow of material, including transportation between operations.

Raw Materials — What materials—kinds and varieties — enter the department?

*This article is based on a paper read July 13, 1932, by Mr. Lowry at the Second Annual Conference on Management Problems of the Smaller Industries, at Silver Bay-on-Lake George, N. Y.

Where do they come from and in what physical form? How and where are they received and stored? What are the storage capacities? How are they handled and transported? What supplies are necessary and incidental to the operations proper? At what point does the delivering department's responsibility cease and the receiving department's begin?

Products—What materials or products—kinds and varieties—leave, and where do they go? Where and how are products, ready for delivery, stored, and what are the handling methods?

Personnel—What is the departmental organization? Who make up the supervisory and clerical personnel? To whom are they responsible? In general, what are their duties and responsibilities? An organization chart usually is effective in this connection. List all persons on the direct and indirect labor payroll, with a brief description of each person's occupation and duties. What are the working hours and number of shifts? What are the hourly base rates; individual and departmental average? What are the existing methods of wage payment? What is the general attitude of the personnel toward the incentive plan?

Operating Costs—What are the existing unit costs? If no unit costs are available, how can pre-application costs be established? Are manufacturing costs accessible for supervision, and to what extent are supervisors able to control them and interested in controlling them? What are the sources of waste and scrap losses, and to what extent are they controllable?

Production Loads—Are production loads fairly steady, or fluctuating? How far in advance are they scheduled, and who does the scheduling? What planning methods are employed by supervision to anticipate requirements and to use labor most effectively? Does the department produce for stock, or only to orders? What are the normal manufacturing quantities, and are set-up changes elaborate or simple?

Miscellaneous—What are the quality or inspection requirements for the product? What are the facilities for accurate control? Is this responsibility definitely placed? Are definite working standards available for reference and instruction purposes?

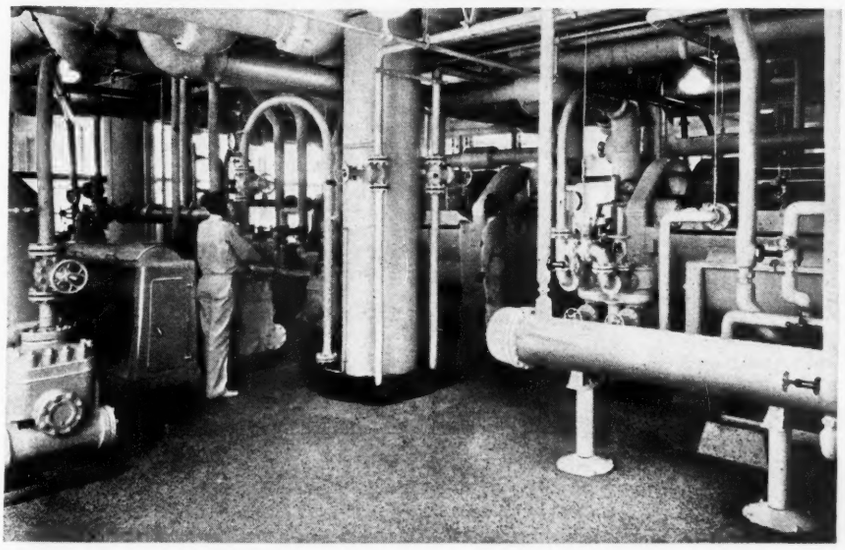
The purpose of the preliminary survey is chiefly to marshal facts and to create a picture of conditions as they exist. Whether existing methods and procedure are best, or not, can be determined later.

The analytical survey probably will have disclosed a number of inconsistencies and lack of uniformity in methods, equipment or facilities that should be uniform. Efforts toward standardization will not be limited to the strict chronological order in which I am giving it in this discussion. Corrective steps should be taken wherever and whenever the need is apparent and when such steps can be justified from a practical standpoint. In standardization, the desideratum is not only for *uniformity* but also for *practical improvement.*

Some of the outstanding points that should be given consideration are as follows:

Methods and Procedure—Have rules and instructions been developed covering the best methods from a technical standpoint? If so, are they available to the operating personnel for reference and instruction purposes. Any apparent discrepancies in this connection should be called to the attention of the technical, advisory and control organizations, such as the engineering department, the laboratory, the inspection and test department, the research or development department, and efforts should be made to establish practical workable standards.

Equipment—Consideration should be given as to whether tools are suited to the operations; whether layouts are advantageous; whether material supplies and handling methods are adequate and convenient.



Even in the Crisco and Flakewhite processing room incentives are feasible.

Planning—If it does not already exist, and the need is apparent, some orderly and systematic method should be developed for the layout and assignment of work. Clerical procedure, however, should be as simple as possible, consistent with the requirements for adequate and accurate reports and records.

Supervision—If they are not already well defined and understood, the responsibilities of supervision should be established, particularly in so far as the operation of a wage-incentive plan is concerned. The policies of the management in this connection should be fully understood by the foreman. He should know specifically his responsibilities in properly carrying out those policies. He should not only thoroughly understand the wage-incentive plan himself but should also know how to explain it to his men. It is the wage-incentive engineer's responsibility to suggest specific methods in this connection. The foreman's personal attitude, and how he reflects it to his men, will have a tremendous influence on the success of the application.

Explanation of Wage-Incentive Plan—It is sufficient to say here that the engineer should spare no effort in making clear to the individual workmen how the wage-incentive plan operates, if they do not already understand it. Patient and repeated explanation usually is well repaid in more prompt response after the standards are put into effect.

"Measurement" is the time study work—the establishment of fair and reasonable operation allowances—the technique of which I do not have the space to discuss.

The "compensation" phase may be identified as that part of the procedure which translates the worker's actual performance—physical or mental—into money, or its equivalent, in his pay envelope. It is the administration of the wage-incentive plan, the details of which may vary somewhat with the plan adopted and with each particular organization and type of business.

"Control" is the phase that keeps the application functioning effectively. After one has gone to all the trouble and expense of standardizing and measuring work, applying standards, and setting up a plan for additional compensation, it is worth going a little further to establish a simple but effective method of control. Many applications are weak in this respect. It is one thing to develop a good, sound plan and put it into operation; it is quite another thing to keep it operating smoothly, effectively, and continuously. Without an adequate system of control, there is always a distinct tendency for procedure to become routine and slipshod.

There must be provision for placing in executive hands, regularly, the pertinent facts in a condensed form, so that danger signals will be quickly apparent if anything should start to go wrong. *However, care must be exercised that executive reports are not made too elaborate.*

A good control plan will place before the plant executive a periodic—usually weekly—summary of the exact labor situation in each department. It is virtually a qualitative and quantitative analysis of those variable and somewhat intangible factors which, when in proper relation to each other, make for low labor costs, and when not in proper relation, make for relatively high labor costs. Every item of work performed will be represented in the total measure of work produced and every minute of time will be accounted for and classified. Good control figures will reflect answers to the following questions:

1. Of the total time-clock hours, how many were on standards? How many on day work? How many are chargeable to delay (usually supervision's responsibility)?
2. What was the total labor output of the department in terms of "standard hours of work," a common measure for all kinds of work, whether it be indirect labor (as janitor work) or direct labor (as straight production work)?
3. How nearly is the department adhering to a predetermined normal capacity?
4. How does the actual labor output compare with pre-application performance and with the established ideals?
5. How was the total payroll distributed with regard to standard work and non-standard work?
6. How much bonus or premium was earned, and what was its relation to base wages?
7. How much money was spent in payroll that would have been saved if every man had produced a full day's work, or more, every day?
8. How much did each "standard hour of work" actually cost? How does that cost compare with pre-application cost?

How nearly was the established ideal cost approached?

9. What were the percentage efficiencies for the department, both while working on standards and as a whole?

The extent to which the desired ideals are approached in all of these points is a measure of how efficiently labor is being handled, how intelligently work is being planned and scheduled, how the working force is being controlled so as to have no surplus labor and yet use effectively all of the potential labor energy on the departmental payroll. The foreman must be alert. He must plan ahead accurately, anticipate his labor requirements sufficiently in advance to make satisfactory disposition of surplus labor and to arrange to secure additional labor when needed. Such methods command active executive support, which is the best guarantee of supervisory support. This, in turn, is absolutely essential to maximum accomplishment in wage-incentive work.

Now, if we have a general picture of the essential characteristics of a good wage incentive set-up, I'll ask each of you readers to picture yourself as my hard-boiled practical boss expecting tangible dollars-and-cents results from a wage incentive application in your factory. I have no time to waste. You are paying me a good salary—why not, since it's only a hypothetical salary?—and you'll probably begin to think about savings in 30 days; expect them in 60 days; demand them in 90 days. If they are not forthcoming, I'll get fired.

Since I don't know the exact nature of the business of a single one of you, I must cite cases, hoping you will recognize something in your own factory or business. The Proctor & Gamble Co. operates two oil-seed crushing mills handling chiefly copra, palm kernels and sesame seed in addition to the fourteen cottonseed oil mills of its subsidiary, the Buckeye Cotton Oil Co. Through analytical surveys, standardization of methods and wage scales and the application of incentive, large savings in labor costs have been effected.

One of the mills engaged in crushing copra will illustrate a method of setting up a wage-incentive plan. The copra is unloaded from the steamer to railroad cars, which are in turn hauled to the mill siding. It is sometimes handled in bulk and sometimes in bags. In either case all handling operations from the steamer into storage are on an incentive basis. The principal mechanical operations in the mill are expelling, grinding, cooking, forming, pressing, and disposing of press cake. The expellers leave 30 per cent or less oil in the cake, of which the portion that it is practicable to extract is removed in the hydraulic presses after a grinding and cooking process. Oil from the presses drains to storage tanks and the press cake is removed, trimmed and packed in bags, either in the form of cake or meal, for cattle feed.

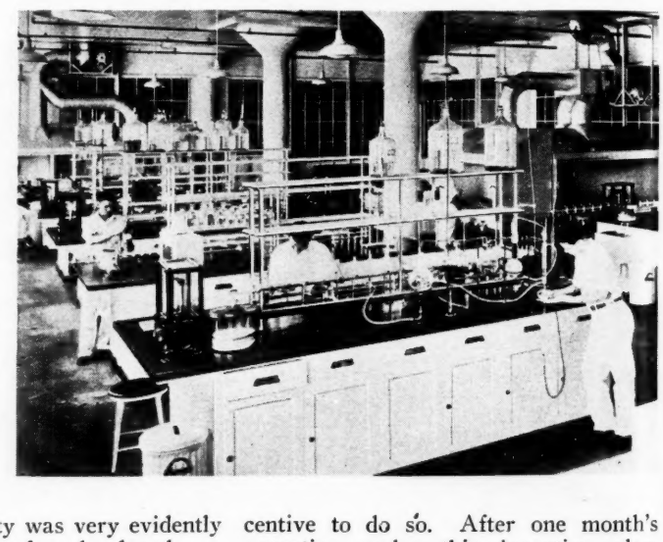
A number of characteristics in this wage incentive application distinguish it from the usual type of production application. The desired results were: (*a*) minimum unit labor cost, (*b*) maximum percentage oil yield, (*c*) maximum tonnage put through the process consistent with the practical press capacity, (*d*) uniform high quality of oil and press cake. Obviously, an incentive plan based solely on getting the highest possible tonnage through the mill would tend to reduce the oil yield per ton and increase the percentage of oil retained in cake. Furthermore, an incentive to obtain the highest possible percentage extraction would tend to lengthen the drainage time in the press beyond practical limits; additional oil obtained by longer pressing does not offset the loss of tonnage, fixed charges on the investment, and operating costs. A combination plan offering incentive for both quality and quantity was very evidently needed and was therefore developed.

Where performance was primarily a measure of physical effort, as in unloading and handling operations, the "fair day's work" became the standard. Wherever quality also was a factor, quality standards were established and had to be met before physical performance was considered in calculating bonus earnings. For instance, it is cheaper to extract the first 20 or 25 per cent of oil from copra by using expellers than by hydraulic presses. The more oil taken out by the expeller, the less will have to be taken out by the presses. Yet, on account of the necessarily high working pressures, the expellers are not capable of getting the desired yield. Furthermore, if expeller pressure is made too high, machine breakdowns become excessive. A proper balance must be found. The result was that bonus for the expeller operator began only when he left less than 30 per cent oil in expeller cake, and increased as he decreased the oil content to the minimum of 25 per cent. He also was paid for tonnage put through up to a maximum which was based on the most effective press drainage time.

Moisture content of meal is an important factor. Minimum and maximum limits have been set and analyses are made hourly. A bonus is paid the cooker operator for keeping the meal moisture within these limits.

Press operation is largely manual and according to a fixed schedule of drainage time, although bonus earnings are subject to quality requirements providing for a maximum permissible percentage of oil in press cake. Trimming, packing and disposing of press cake also are manual operations requiring no discussion.

This specific application shows the wisdom of measuring performance on more than a physical basis. Operators required to exercise judgment in connection with their manual efforts invariably can do a better and more consistent job when they have sufficient incentive to do so. After one month's operation under this incentive plan, weekly production had increased 50 per cent, operators were earning 14 per cent more money, and unit labor cost was reduced approximately 34 per cent.



Bonuses ofttimes depend on results of laboratory control and quality tests.

To illustrate further the application of wage incentives in the food industries I shall take only one step in the manufacture of edible products from vegetable oils which involves such operations as refining, bleaching, hardening, roll-operation, filling, wrapping and packing case goods as well as bulk products in cans, tubs, barrels and tierces. In practice all of these operations have been put on a wage-incentive basis.

Refining cottonseed oil is distinctly a processing industry as distinguished from mechanical or other highly repetitive industries usually used for examples of wage incentive application. In this application it is not necessary to go into the complex details of the refining process to show how the plan was applied. Briefly, the crude oil is received in tank cars, is sampled for analysis, and is then pumped to the refining kettles, where it is subjected to chemical processes to remove free fatty acids and

foreign matter, and to separate the refined oil from the settlings. Obviously, the desired result is to obtain as much highly refined oil as possible from a given quantity of crude.

During the process it is deemed advisable at a number of stages to allow limited latitudes of judgment on the part of operators and refiners. These men have available a vast quantity of data, drawn from past experience, to guide them in the selection of the proper strengths and quantities of refining agents for oils having certain physical and chemical characteristics. Similar indexes are found in the results of laboratory tests of the samples. The operators are given instructions, within limits, regarding agitation time and temperature control. The incentive plan stimulates them to take full advantage of all these facilities, to exercise extreme care in weighing and mixing ingredients, to decant carefully and as completely as possible when pumping the refined oil off the settlings on the bottom of the kettle, and to avoid spilling and losing oil through carelessness.

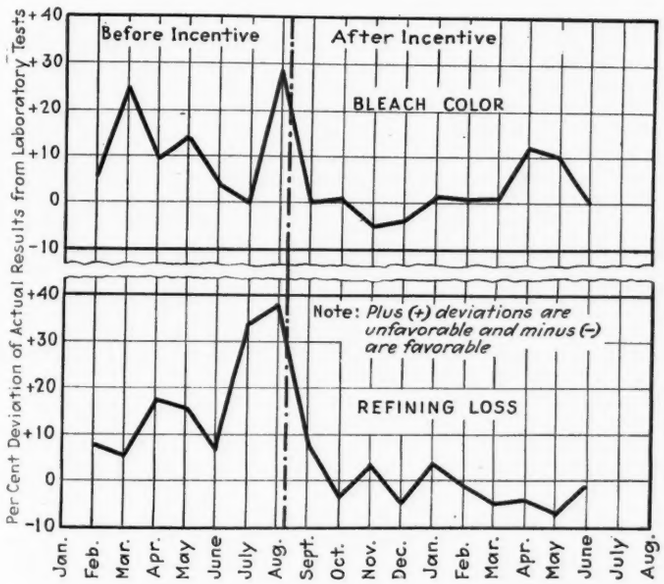
Color is the measure of quality of the refined oil, and unless color is within specifications no bonus can be earned, regardless of the results from a quantitative standpoint (ratio of loss or settlings to the original quantity of crude). Thus, any temptation to slight quality, in the effort to secure low losses, is eliminated.

An operating incentive plan to reduce refining loss, first of all, had to be flexible enough for use during all seasons of the year, for variable production schedules, and for variable grades, or qualities, of crude oil. It had to provide for standards that would be simple to apply and to check, and it had to provide a means for comparing results with previous performance and for calculating savings.

Obtaining the standards with which results could be compared was, of course, the chief problem. Obviously, a standard based on absolute averages of past performance was not feasible, because of the variations in quality of crude. Comparisons of actual kettle results with the laboratory results, both of tank car samples and of kettle samples, was considered. This standard was discarded in favor of a composite sample made up of representative kettle samples of all kettles refined over a period of a week, because some losses that must be included in the results are determined only once each week.

The best laboratory result from several tests of this composite sample is regarded as the standard, or ideal, result for any particular week's work, and bonus earnings are determined by the deviation from this best result. Thus, the standard is not fixed, but fluctuates according to the quality of the crude. This plan was tested for a period of 22 weeks before being put into operation. The theoretical results were calculated and the plan was found to be sound from a practical standpoint. Over the test period, records showed that average actual losses were approximately 12.8 per cent greater than the losses indicated by the best laboratory tests. This finding supported data from years of previous experience, which indicated that a 10 per cent or less deviation could be regarded as satisfactory refining. Plus 10 per cent deviation accordingly was adopted as the starting point for bonus payment, subject always to the requirement that all refined oil must meet rigid quality specifications.

The first six months of operation showed the results given in Table I, as compared with the 22 weeks' test period immediately prior to application. Several hundred kettles were refined in each of these periods, thus making the periods representative and the results really significant.


Per Cent Deviation of Actual Results from Laboratory Tests
+40
+30
+20
+10
0
-10
Before Incentive
After Incentive
BLEACH COLOR
Note: Plus (+) deviations are unfavorable and minus (-) are favorable
REFINING LOSS
Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec. Jan. Feb. Mar. Apr. May June July Aug.

Application of wage incentives greatly improved quality of product and lowered processing losses.

Not only were practical results improved from a 12.8 per cent average to a 0.0-per cent average deviation from the composite sample but the deviation from the average of individual kettle sample tests was improved from 7.11 per cent to (—) 0.725 per cent (actually better than laboratory tests). The reduction in deviation between average of kettle samples and composite samples also indicates improvement in laboratory technique.

Now for the cost of installing and administering wage-incentive work such as I have described. True cost, of course, is not an absolute figure in dollars and cents so much as it is the ratio which that absolute figure bears to the absolute return. Time also is an element in figuring true cost. When do we expect complete return on our investment? In one month? One year? Two years? Five years? The more profitable installations probably will be made first, so that the cost of later installations is relatively higher. While the difficulty of being exact is apparent, I believe it is reasonable to expect the cost of operating the incentive plan to be between 15 and 25 per cent of the saving, particularly after the installation has become stabilized. Naturally, the charges may exceed the return for a few months or while the salary of the installation engineer is being absorbed, while studies are being made, and before the savings have started to appear. I should expect my money back at least four or five times in the first two years. If I didn't get it, I would investigate the clerical procedure very carefully.

I have not discussed incentives for supervision. These include incentives to influence control not only of wage costs but of all operating costs such as repairs and maintenance, steam, water, power, depreciation, administration, and other overhead charges; control of scrap loss, usage of materials and supplies; and control of quality of the product. Many of these things are difficult to measure, but few, if any, are impossible, and it is my firm conviction that all industry, large and small, has only scratched the surface of the possibilities for better and more economical management.

Table I—Results of a Wage Incentive Installation

(Vegetable Oil Refining Operations)

	Average of 22-Weeks' Test Period Per Cent	Average of First 6 months of Application Per Cent
Deviation of actual results from composite sample...	+ 12.8	0.0
Deviation of actual results from average of individual kettle samples..	+ 7.11	— 0.725
Deviation of average of individual kettle samples from composite sample	+ 4.23	+ 0.725

WHAT'S ON YOUR MIND?

And Still More About Cocoa-Milk

To the Editor of FOOD INDUSTRIES:

In reply to your request for additional information concerning patents on sterilized cocoa-milk beverages which are treated with thickening agents to render the cocoa non-settling, I think it will suffice to enlarge somewhat on the two patents referred to in my article "Cocoa-Milk Beverages Require Technical Control," published in the July issue of FOOD INDUSTRIES.

Citing U. S. Patent No. 1,076,122 (Fig. 1), entitled "Process of Treating Cocoa," granted to Henry Blount Hunter, of Norfolk, Va., on Oct. 21, 1913, I call attention to lines 9 to 12, in which Mr. Hunter states that he treats "fluid preparations of cocoa to improve the flavor and texture." It is significant to note that as he outlines his method of mixing the ingredients, he, in line 18, reserves the right to add "such other substances as I may wish." This gives him the right to add milk and tapioca starch or other thickeners, and his use of the term "fluid" in line 10 shows that he had a beverage in mind.

In describing the preliminary heating of the mixture, statement is made, in lines 24 to 26, that it must be heated "sufficiently to convert the starchy matter present in the cocoa into an emulsifying agent." This statement and his use of the term "texture" in line 12 tells that he recognized the function of starchy substances in increasing the viscosity of cocoa beverages.

The mixture is transferred to a "hermetically sealed container" (line 28), which is then heated "to a temperature of between 100 and 125 deg. C. for such length of time as is found necessary to bring about certain desirable changes in the flavor." On the Fahrenheit scale this temperature range is 212 to 257 deg. As the usual process of sterilization involves heating cocoa-milk beverages to 240 deg. F. for 20 minutes, Mr. Hunter's patent gives the right to use this temperature for whatever length of time his judgment dictates.

Inclosed is a letter (Fig. 2) to me from H. B. Hunter, president of the H. B. Hunter Co., Norfolk, Va., dated Sept. 16, 1931, in which all of these points and others are covered. Among the patents referred to in Mr. Hunter's letter is a French patent, No. 345,520, class II/4, granted Oct. 19, 1904. This patent (Fig. 3), granted to Joseph Talansier, of France, reads as follows:

"PROCESS FOR THE PREPARATION AND CONSERVATION OF A LIQUID AND HOMOGENEOUS CHOCOLATE

"The present invention relates to the preparation of a liquid chocolate which remains homogeneous and may be kept indefinitely, so as to be transported to all countries, even the hottest, without losing any of its properties.

"This process comprises a combination of means and apparatus consisting of three principal steps.

"The first step comprises the intimate admixture of the various constituents, which are: water for the solution, finely comminuted chocolate without sugar, milk, sugar and, finally, the desired flavoring (vanilla, cinnamon, etc.). These different ingredients enter into the mixture in proportions varying according to the quality of the liquid chocolate desired. The mixing is done in open tinned or silvered vessels heated over a water bath to a temperature varying from 80 to 90 deg. The duration of the heating is about two hours.

"For certain localities, where a thick chocolate is required, a slight proportion of starchy material, preferably manioc starch, is added to the mixture.

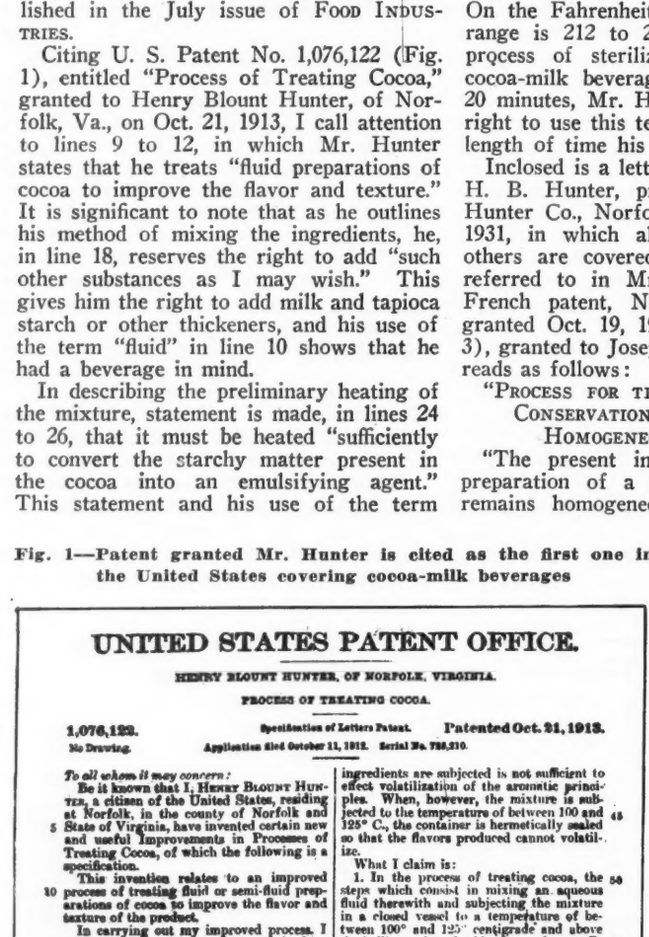
"The second step consists in homogenizing the liquid chocolate obtained by the first operation and in pulverizing its elements so as to effect complete subdivision of the nucleii and cells. For this purpose the mixture is cooled to a temperature varying between 65 and 70 deg. and subjected to the action of a homogenizer under a pressure varying between 180 and 300 atmospheres; the highest should be used only when the products are intended for export to distant regions.

"The emulsion produced by this treatment forms an exquisite, smooth chocolate, the constituents of which are permanently united. The chocolate thus treated is termed 'fixed'—that is, permanently and stably homogenized.

"Another advantage of this operation is that of producing the chocolate in very digestible form, by reason of the extreme subdivision due to the fixing process.

Fig. 1—Patent granted Mr. Hunter is cited as the first one in the United States covering cocoa-milk beverages

Fig. 2—"Thickeners" have been used in chocolate and cocoa-milk beverages for nearly twenty years



UNITED STATES PATENT OFFICE.

HENRY BLOUNT HUNTER, OF NORFOLK, VIRGINIA.

PROCESS OF TREATING COCOA.

1,076,122. Specification of Letters Patent. Patented Oct. 21, 1913.

No Drawing. Application filed October 11, 1912. Serial No. 725,210.

To all whom it may concern:

Be it known that I, HENRY BLOUNT HUNTER, a citizen of the United States, residing at Norfolk, in the county of Norfolk and State of Virginia, have invented certain new and useful Improvements in Processes of Treating Cocoa, of which the following is a specification.

This invention relates to an improved process of treating fluid or semi-fluid preparations of cocoa to improve the flavor and texture of the product.

In carrying out my improved process, I prepare a syrup of cocoa which may be done in the usual way as, for example, by mixing together in a kettle or other suitable container sugar, water, and cocoa, and, if desired, such other substances as I may wish to add.

These ingredients are then heated in the kettle to a temperature of not above 80° C. so as not to volatilize any of the aromatic ingredients, but sufficiently to convert the starchy matter in the cocoa into an emulsifying agent, and after the whole has been thoroughly "worked" in said container by means of any suitable stirring device, it is transferred to a hermetically sealed container, preferably made of tin plate, in which it is subjected to a temperature of between 100 and 125° C. for such length of time as is found necessary to bring about certain desirable changes in the flavor of the cocoa used. This last mentioned heating is preferably effected by subjecting the container to heat in an autoclave by means of steam under pressure.

In making the syrup in the kettle or other vessel before placing in the sealed container, it is immaterial whether this vessel be closed or not, since the temperature to which the ingredients are subjected is not sufficient to effect volatilization of the aromatic principles. When, however, the mixture is subjected to the temperature of between 100 and 125° C., the container is hermetically sealed so that the flavors produced cannot volatilize.

What I claim is:

1. In the process of treating cocoa, the steps which consist in mixing an aqueous fluid therewith and subjecting the mixture in a closed vessel to a temperature of between 100° and 125° centigrade and above the boiling point of said mixture for a sufficient time to bring about changes in the flavors thereof.

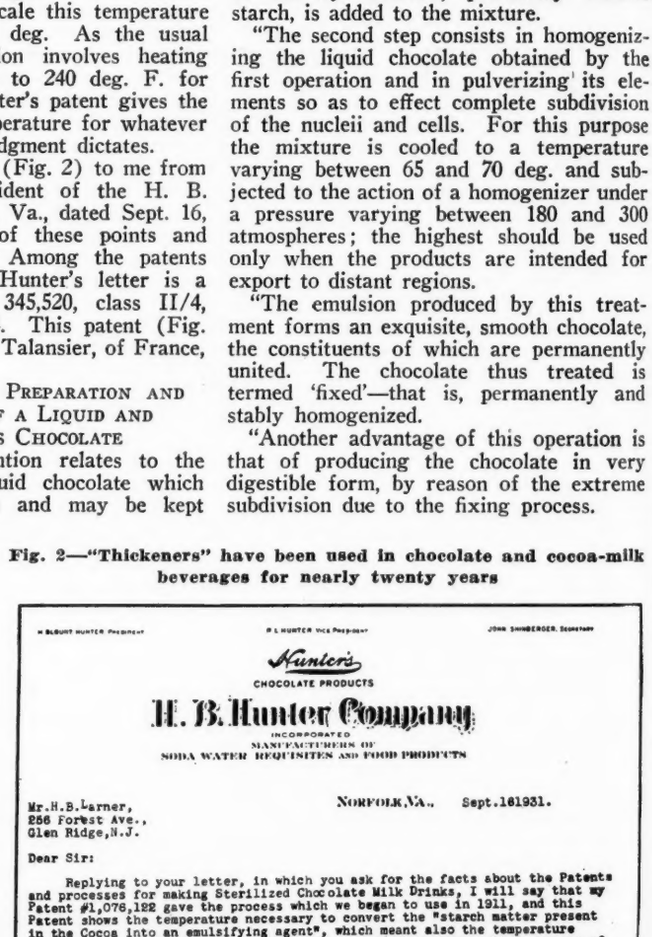
2. In the process of treating cocoa, the step which consists in subjecting a syrup of cocoa to a temperature of between 100° and 125° centigrade and above the boiling point of said syrup within a hermetically sealed container for a sufficient time to bring about changes in the flavors of said syrup.

3. The process of treating cocoa, which consists in heating cocoa together with an aqueous liquid to a temperature sufficient to convert the starchy matter present in the cocoa into an emulsifying agent, but keeping the temperature as low as possible in order to bring about this result, then heating the mixture thus treated in a hermetically sealed container to a temperature of above 100° centigrade and above the boiling point thereof for a sufficient time to bring about changes in the flavors of said mixture.

In testimony whereof I affix my signature in presence of two witnesses.

HENRY BLOUNT HUNTER.

Witnesses:
P. K. SCOTT,
E. B. JOHNSON.



H. BLOUNT HUNTER, President — P. L. HUNTER, Vice President — JOHN SHINBERGER, Secretary

Hunter's CHOCOLATE PRODUCTS

H. B. Hunter Company

INCORPORATED

MANUFACTURERS OF SODA WATER REQUISITES AND FOOD PRODUCTS

Mr.H.B.Larner, NORFOLK,VA., Sept.161931.
256 Forest Ave.,
Glen Ridge,N.J.

Dear Sir:

Replying to your letter, in which you ask for the facts about the Patents and processes for making Sterilized Chocolate Milk Drinks, I will say that my Patent #1,076,122 gave the process which we began to use in 1911, and this Patent shows the temperature necessary to convert the "starch matter present in the Cocoa into an emulsifying agent", which meant also the temperature necessary to convert added starch into an emulsifying agent, which was one of the ingredients we used. We have also used Vegetable Gums and various other substances since that time, and some of our customers have used Gelatin and other thickeners for the past ten years, because we have helped them improve their formulas from time to time and know just what they are using.

We have made quite a number of Chocolate and Cocoa Beverages using Milk and other things, in addition to "thickeners" for nearly twenty years, and while we have noted several Patents issued in the meantime, covering specifically homogenized Milk Drinks, we have never considered these Patents as being inventions. The oldest of them is the one granted to De Guzman in 1914 and this has expired, so from our view-point, the use of sterilizing temperatures, as well as "thickeners" in Milk Drinks, are now processes open to the use of anyone who wants to use them.

We could cite Patents that are now long out of date, covering the use of many emulsifying agents in Cocoa and Chocolate Beverages, as we have many copies of such Patents in our safe but you can save yourself a lot of trouble by taking our word for it, that the use of such thickeners is now"ancient history", and we cannot understand how anyone who is versed in such matters could think that the use of any edible starch, gum or other thickener is a new thing for mixing with Chocolate products of any kind.

Yours very truly,

H.B.Hunter Co.,Inc.

President.

HBH/T

"The purpose of the last step is to assure the preservation of the liquid chocolate. For this purpose the fixed mixture is put into tinned receptacles or bottles. In both cases the first thing to be done is to expel all the air, because, in time, oxygen will attack and oxidize the fatty material of the milk and the cocoa and produce a rancid taste in the product. After the air is expelled, the bottles or receptacles are hermetically sealed and subjected, in an autoclave, to a temperature of 110 to 115 deg. for a period of time varying from 15 to 25 minutes, according to the dimensions of the containers.

"On removal from the autoclave the containers are cooled, and the stability of the product is assured from that time on."

You will note that Talansier's first step involves the mixing together of chocolate, sugar and liquid ingredients, including milk, and that for a thick product he recommends the use of manioc starch, which is merely another term for tapioca flour.

The mixture is homogenized at a pressure between 180 and 300 atmospheres, which is from 2,600 to 4,400 lb. He specifically calls attention to the "emulsion" formed by this treatment and states that the product is "fixed," or, in other words, "stably united."

His last step consists of putting the product in bottles, which are then hermetically sealed and are heated in a sterilizer at a temperature between 110 and 115 deg. for a period of 10 to 25 minutes. He refers, of course, to the Centigrade scale of temperatures, the Fahrenheit equivalent of which is 230 to 239 deg.

It is perfectly clear that M. Talansier understood very well the process of producing a sterilized cocoa-milk beverage with non-settling properties.

In a letter to me dated Dec. 4, 1931, H. B. Hunter refers to the Talansier patent and also to his own, and I quote from his letter as follows:

"In conclusion, I will say that while I took out the first American patent which gave a working process for a sterilized milk-chocolate drink, I have been convinced ever since I saw a copy of the French patent No. 345,520 that that patent was the underlying one and made so that all subsequent patents covering sterilized milk-chocolate drinks, both with and without thickeners, are worthless."

In order that you may be fully informed regarding this matter, I attach hereto copies of the patents and the original correspondence referred to.

HERBERT B. LARNER.

* * *

To the Editor of FOOD INDUSTRIES:

It was quite a shock to read your editorial, on Page 230, in the July, 1932, issue entitled "Help Wanted."

This subscriber emphatically answers "NO."

Should the wheels of progress be temporarily stayed by a digression through the bog of booze, the main road will again be quickly found and a drier and happier people will result from such an experience. Such is our belief in the U. S. citizenry.

Frankly, we believe the question at this time is premature, as modification of the Eighteenth Amendment is doubtful. Many overlook the fact that it is reinforced by the Nineteenth.

As your splendid journal has as its caption, "The Journal Devoted to the Problems of the Food Manufacturer," we believe that should the future bring competition to the food manufacturer from this now outlawed industry, there would be a very large problem facing the food manufacturer and one which the food industries' journal could greatly assist in solving.

Competition for the consumer's dollar is keen now, but with advertising in a large way from another source, such as the liquor interests would no doubt put on, the problem of maintaining or of increasing their market would be a new source of worry for all food manufacturers. (We believe liquor's proper classification to be that of a narcotic, and not entitled to a food classification.)

Whatever situation develops, it must always be remembered that the majority rules, and whatever is "the greatest good for the greatest number" should have the support of the best-thinking folks and journals. The old saying "as we make our bed, so must we lie on it," is particularly applicable to the question involved between the food manufacturer and the liquor problem.

LUTEY BROKERAGE CO.,
Per William Lutey,
Seattle, Wash.

* * *

To the Editor of
FOOD INDUSTRIES:

"Help Wanted" was a rather startling topic coming from an organization of such outstanding ability.

Booze and its allies are not food, having little if any part in the constructive development of a people; instead they rather degrade, depreciate, and tear down the sound wholesomeness of those who would otherwise make fine citizens.

Money now spent in "legitimate food channels" can be the only money that would eventually support the "booze ring," and should answer the question you ask in sufficiently large type to thunder a "NO" to your question.

Personally, I find that the path is so plain that I am astounded at the logic advanced by the apparently sincere individuals in their request for repeal. I am not convinced that this commonwealth has lost its mental poise to the extent that we are to turn this nation over to the Booze Barons, fully knowing the history that that industry has recorded as a heritage to our children.

When the noise of shouting of uncontrolled impulses is quieted and if ever a try is again made to grant booze a retrial, this nation will be a much sadder but wiser people, asking as did Rip Van Winkle, "Where was I when repeal was voted?"

Last week I visited a controlled dominion to observe more drunks in three days than I have seen in my city in a year's time. Seeing no evidence, I asked where the revenues went from booze (for they are taxed worse than we are) and they admitted there was not anything to show for it.

I asked why such widespread unemployment when our repeal advocates promised so much employment. Again, why so much grain surplus where brewing should consume so much, especially since so much was consumed by Americans as admitted?

No, Mr. Editor, when we look the thing squarely in the face and think, booze makes a poor bedfellow.

There is just one answer: "NO."

GUY LEWIS,
Lewis Pure Foods, Inc.,
Seattle, Wash.

* * *

To the Editor of FOOD INDUSTRIES:

The August issue of FOOD INDUSTRIES arrived today. I was much interested in the article "Manufacturers' Spot Stocks—Misuse of Common Sense in Distribution." In my judgment it is a timely article. At the monthly meeting of the directors of the Florida Grapefruit Canners' Association, tomorrow, I shall call it to their attention and recommend that they give it their careful consideration.

The article on "Control Chemist or White-Coated Window Dressing?" also hits the bull's-eye.

I am sorry that I cannot say the same for the article "Why Fear Repeal?" . . .

CLAUDE E. STREET,
Florida Grapefruit Canning Co., Inc.,
Bradenton, Fla.

* * *

To the writers of these three letters, we express our appreciation for their views on prohibition repeal.

Help Wanted—The original question, however, for which we appealed for help, is still unanswered. It is not a question of whether alcoholic beverages are a good thing for the people, or for the business of manufacturing food.

The question is, if repeal does come, shall FOOD INDUSTRIES bring before its readers the best technical knowledge gained from the alcoholic beverage industry?

THE EDITORS.

Fig. 3—First page of French patent covering chocolate-milk beverages granted M. Talansier in 1904

RÉPUBLIQUE FRANÇAISE.

OFFICE NATIONAL DE LA PROPRIÉTÉ INDUSTRIELLE.

BREVET D'INVENTION

II. — Alimentation.

4. — Produits et conserves alimentaires. N° 345.520

Procédé de préparation et de conservation d'un chocolat liquide et homogène.

M. Joseph TALANSIER résidant en France.

Demandé le 11 août 1904.

Délivré le 19 octobre 1904. — Publié le 9 décembre 1904.

La présente invention a pour objet la préparation d'un chocolat liquide, restant homogène et pouvant se conserver indéfiniment de façon à pouvoir être transporté dans tous les pays même les plus chauds sans qu'il perde une seule de ses qualités.

Ce procédé comporte un ensemble de moyens et d'opérations comprenant trois phases principales.

1° La première phase comprend le mélange intime des divers composants qui sont: l'eau pour dissoudre, le chocolat sans sucre finement broyé, le lait, le sucre et enfin l'aromate désiré (vanille, cannelle, etc.). Ces divers ingrédients entrent dans le mélange en proportions variables suivant la qualité du chocolat liquide que l'on veut obtenir. Ce mélange est fait dans une bassine étamée ou argentée chauffée au bain-marie à une température variant de 80° à 90°. La cuction dure environ deux heures.

Pour certaines régions où l'on exige des chocolats épais on ajoute au mélange une faible proportion de matière amylacée, de préférence de la fécule de manioc.

La seconde phase consiste à homogénéiser le chocolat liquide obtenu par la première opération et à pulvériser ses éléments de façon à obtenir une division absolue des noyaux et cellules. A cet effet on fait refroidir le mélange à une température variant entre 65 et 70° et on le soumet à l'action d'un appareil à homogénéiser sous une pression variant entre 180 et 300 atmosphères; la pression la plus élevée ne s'emploie que pour les produits destinés aux exportations lointaines.

L'émulsion produite par ce traitement constitue un chocolat exquis, onctueux et dont les éléments sont indissolublement unis. Le chocolat ainsi traité est ce qu'on appelle *fixé*, c'est-à-dire homogénéisé d'une façon fixe et durable.

Cette opération a en outre l'avantage considérable de mettre le chocolat sous une forme éminemment digeste, par suite de la division extrême due à la fixation.

La dernière phase a pour but d'assurer la conservation du chocolat liquide. A cet effet le mélange fixé est introduit dans des récipients en fer-blanc ou dans des bouteilles. Dans les deux cas on commence par expulser des récipients tout l'air car à la longue l'oxygène attaque et oxyde la matière grasse du lait et du cacao et donne un goût de rance au produit. Dès que la désoxygénation est opérée, on ferme hermétiquement les bouteilles ou récipients et on les soumet dans un autoclave à vapeur à une température de 110 à 115° pendant un temps variant entre 15 et 25 minutes suivant la dimension des récipients.

Prix du fascicule : 1 franc.

Preparing Cream With a Desired Fat Content

By D. S. DAVIS
Dale S. Davis Associates
East Northfield, Mass.

CREAM having a predetermined fat content is commonly prepared by diluting high fat cream with milk. This operation involves a calculation which may be advantageously handled by means of an alignment chart as well as determined mathematically.

In making this mixture it is evident that the fat contents of the milk and of the cream must be taken into consideration. M pounds of milk with (m) per cent of fat contains $\frac{Mm}{100}$ pounds of fat and C pounds of cream with (a) per cent of fat provides $\frac{Ca}{100}$ pounds of fat. Together they give a total of $\frac{Mm + Ca}{100}$ pounds of fat. This is to say, that together, if chosen in the proper proportions, the mixtures give a cream in which the total weight of fat is $\frac{(M + C)d}{100}$, in which d is the desired percentage of fat content.

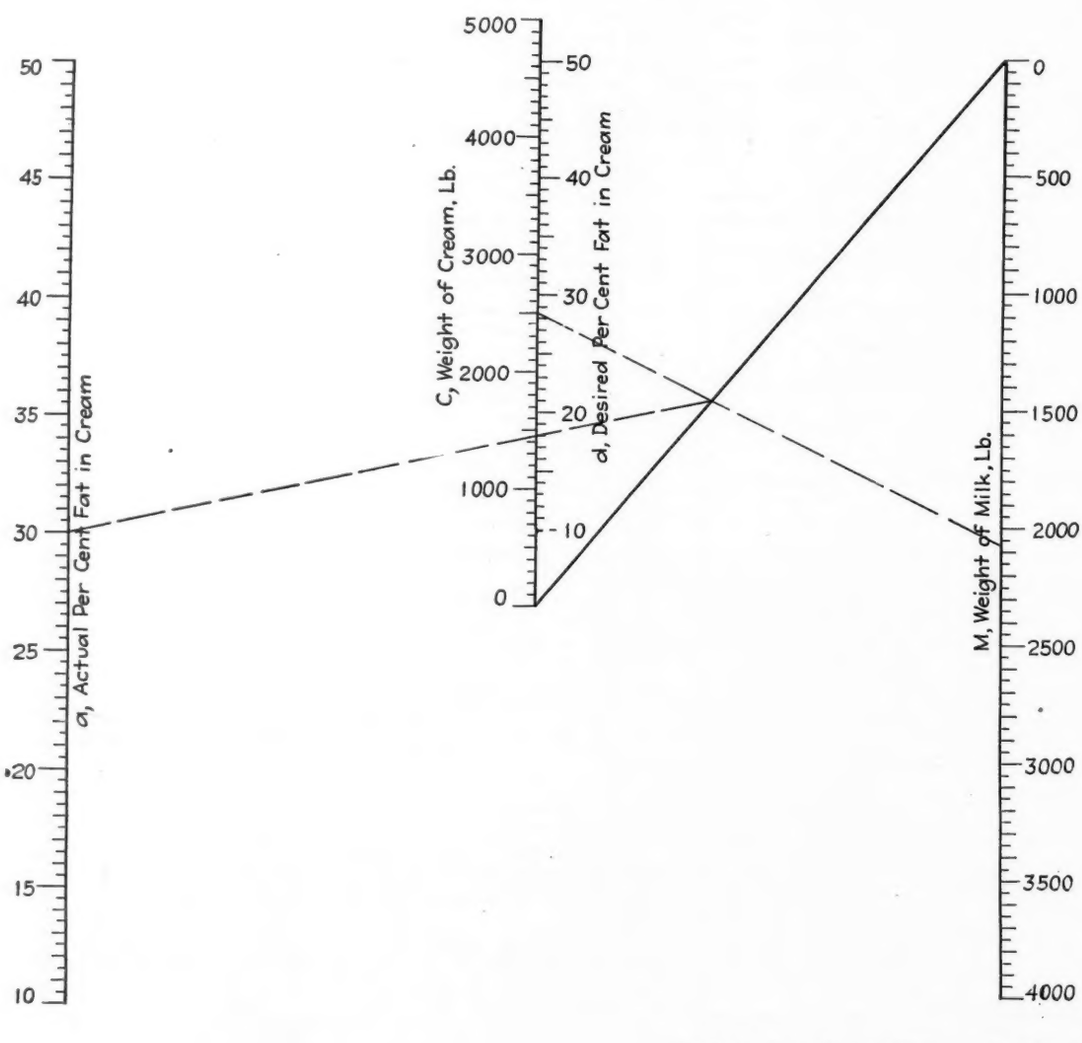
Equating the two expressions for the total weight of fat, the mathematical statement becomes $\frac{Mm + Ca}{100} = \frac{(M + C)d}{100}$, from which we get $M = \frac{a-d}{d-m} C$, known as equation (1).

Substituting the usual value for fat content of milk ($m = 3.5$), equation (1) becomes $M = \frac{a-d}{d-3.5} C$, which is equation (2).

Equation (2), which requires two operations of subtraction and one each of division and multiplication, is the step in the calculation which may be solved quickly and accurately by means of the accompanying nomograph. Its use may be illustrated as follows: How much milk with a fat content of 3.5 per cent should be mixed with 2,500 lb. of heavy cream having a fat content of 30.0 per cent to prepare a coffee cream with a fat content of 18 per cent? Following the key, connect 30.0 on the a-scale with 18 on the d-scale and produce the broken line to meet the diagonal. Connect this latter intersection with 2,500 on the C-scale and produce the second broken line to meet the M-scale in the desired value: 2,070 lb. of milk.

The chart permits values of M to be estimated to the nearest 10 lb. and, though rigorously correct only for values of $m = 3.5$ per cent, it can be used without serious error when the fat content of the milk varies somewhat from this amount. When the true value of m exceeds 3.5 per cent, the use of the chart will result in values of M which are slightly low, the percentage discrepancy decreasing with increasing values of d. This is shown in the following table, which covers the case of milk with an actual fat content of 3.7 per cent:

d, per cent	15	25	35	45
Percentage error in M:	—1.7	—0.9	—0.6	—0.5



BOOK REVIEWS

MILK PRODUCTION AND CONTROL. REPORT OF THE COMMITTEE ON MILK PRODUCTION AND CONTROL. A publication of the White House Conference on Child Health and Protection. Published by Century Co., 353 Fourth Ave., New York, N. Y., 1932. 392 pp., 6¼ x 9¼; cloth. Price, $3.

BECAUSE of the importance of milk in the nutrition of the growing child, the White House Conference included in its activities an investigation of the public health, the nutritional, and the economic aspects of our national milk supply. The formal report of the committee, which consists of a group of nationally known authorities on various phases of the dairy industries, is broader in scope than the title would indicate, especially in regard to the nutritional qualities of milk.

Diseases transmitted through milk and public health supervision of milk are discussed in two short chapters. About half the book is devoted to the nutritional aspects of milk and milk products, but, unfortunately, these excellent sections have not been expanded to include ice cream, butter and cheese. The economic aspects of milk are discussed under the following headings: the consumption of fluid milk and milk products; the production, marketing, transportation, processing and delivery of milk; and the economic importance of the sanitary quality of milk and cream.

This excellently edited and printed monograph has a rightful place in the library of every one interested in the production, distribution and utilization of dairy products.

L. W. BASS.

* * *

ECONOMICS OF FOOD CONSUMPTION. By Edith Hawley. Published by McGraw-Hill Book Co., 330 West 42d St., New York, N. Y., 1932. 335 pp., 6¼ x 8¼; 11 figures, 31 tables; cloth. Price, $3.

UNLESS the reviewer is seriously mistaken, this is the first book ever written on the subject of food economics from the standpoint of the consumer. This very little known and less understood subject, consumer economics, is becoming increasingly important as man develops his ability to provide for his own needs.

Studying this book from the viewpoint of the food manufacturer, we are surprised at the wealth of the material presented, as well as the absence of certain information that one would expect to be included. However, Dr. Hawley frankly states that she has taken the welfare of the consumer as her purpose and has avoided entirely the possibility of profitable sale of foods by their producers. The very interesting subject of inter-commodity competition of foods—or, from the consumer angle, the possibility of substituting one food for another—seems to receive less attention than it deserves. But one must not consider that the relative absence of his pet hobby is a defect when it is realized that this is the first book on the subject.

The food habits of the population, including much material on the science of nutrition, as well as the cost of food, are treated in the first section. Economic factors affecting food consumption, such as seasonal price cycles, are discussed in the second part, in addition to other factors, such as marketing, combinations of food manufacturers, and legislation. Mathematical studies of consumer economics appear in the third section, which is devoted to source material, covering food statistics, index numbers, and calculations of the nutritive needs of a family.

* * *

POWER PLANT MANAGEMENT. By Walter N. Polakov. Published by McGraw-Hill Book Co., 330 West 42d St., New York, N. Y., 1932. 176 pp., 5x7½; 28 illustrations; cloth. Price, $2.

DRAWING upon his more than twenty years' experience in the field, the author has filled a gap in management literature by offering a set of long-tested practical references, telling how to organize the human side of work in the power house. He explains how to investigate the economic and engineering soundness of the power-plant organization, gives much information on the allocation of duties—practical details of management that may be adopted without confusion or expense—and supplies actual case accounts to show results of the adoption of these methods.

The contents of the book include much of the material contained in a series of articles by Mr. Polakov which ran in *Power* from May 14 to Dec. 3, 1929. Starting with executive functions, it takes up in order the duties of the plant superintendent, chief operating engineer, watch engineer, head fireman, power-plant clerk, power record man, steam and power dispatcher, and maintenance man. Succeeding chapters deal with work schedule charts, repair records, inspection and care of instruments, fuel utilization charts, timekeeping, sub-stores, idle expense record, power expense classification, task work with bonus, tickler, and betterment recommendations.

In the appendix several cases from actual practice are described under the titles, "Task Work With Bonus in a Central Station," "Permanence of Improvement in a Small-Size Plant," "Distribution and Utilization of Steam and Power," and "Economy Plus Employee Satisfaction in a Small Plant."

* * *

THE CALCULATION OF HEAT TRANSMISSION. By Margaret Fishenden and Owen A. Saunders. Published by His Majesty's Stationery Office, Adastral House, Kingsway, London, W.C.2., 1932. Obtainable from British Library of Information, 270 Madison Ave., New York, N. Y. 280 pp., 9¾x6¼; 54 illustrations; cloth. Price, 10s. ($1.80).

A WORKING knowledge of the principles of heat flow and of the laws and numerical coefficients applicable to different cases involving heat transmission is of first importance to engineers and technologists employed in every branch of the food industries in which heat processing is involved. Unfortunately, much reliable information on the subject is widely scattered through original papers that have appeared in technical publications during the past ten to twenty years and heretofore has not been readily available.

Under the auspices of the British Fuel Research Board, the authors have compiled this scattered material, interpreted experimental investigations, and made comparison so far as was consistent with fundamental principles of radiation, conduction and convection. Included are some numerical examples indicating how the available information is applicable to the calculation of heat transfer in a number of simple cases. Numerical values of heat-transfer coefficients are given for as wide a range of conditions as possible so that the engineer can work out his individual problems. However, there is need for further experimental work, because the subject of heat transfer is highly complicated and because with present knowledge, accurate prediction of heat transfer under any given condition is often not possible.

For the reader interested in original sources a bibliography containing 198 references is given.

* * *

STRUCTURE AND COMPOSITION OF FOODS. VOL. I—CEREALS, STARCH, OIL SEEDS, NUTS, OILS; FORAGE PLANTS. By Andrew L. Winton and Kate Barber Winton. Published by John Wiley & Sons, Inc., 440 Fourth Ave., New York, N. Y., 1932. 710 pp., 6¼x9¼; 274 illustrations; cloth. Price, $8.50.

CONSIDERABLE emphasis has been placed on the chemical composition of foods and on their behavior under biologic conditions. This knowledge, while highly important, is of no greater value to the food manufacturer than that pertaining to the physical structure and composition of the materials he is converting into consumer goods. With the greater development of food-processing industries, realization of the need for knowledge on physical structure has become more general and has given rise to more intimate study of foods and methods for their processing.

In preparing this comprehensive reference work on food and food materials, the authors have sought to collect and classify, as well as summarize, information that is widely scattered in literature and to publish for the first time their own contributions on the macroscopic and microscopic structure of a great variety of products. As former state and federal chemist and microscopist the authors have a background that thoroughly fits them for this task. They have supplemented their fitness by collaborating with and consulting many other chemists and microscopists throughout the world in preparing the present volume.

This volume, the first of three that are to be prepared, is divided into three parts dealing with starches and cereals, oil seeds, and forage plants. Each of the three parts is subdivided into sections pertaining to genera classification under which individual species and individual plants or seeds are dealt with in detail.

Chemical composition data tables as well as macroscopic and microscopic illustrations have been included, which give this reference book more than double value.

ABSTRACTS OF CURRENT LITERATURE

PRELIMINARY STUDIES OF CHURN SANITATION. H. B. Morrison, Jr., H. Macy and W. B. Combs. *Journal of Dairy Science,* Vol. XIV, No. 5, pp. 404-415.

Various methods for treating churns to eliminate microorganisms or to prevent contamination showed that daily hot water treatment was most effective. This daily use keeps the crevices between staves closed and keeps surface mold growth low. Surface molds were destroyed by revolving a churn for 30 minutes when partially filled with water at 96 deg. C. Treatment with steam was effective against molds but caused the paint on the churn to blister badly. Solutions of sodium hypochlorite, alkaline crystalline hypochlorite, and chloramine T were ineffective against molds. None of the treatments was particularly effective against bacteria.

* * *

A PHYSIOLOGICAL VIEW OF FREEZING PRESERVATION. H. C. Diehl. *Industrial and Engineering Chemistry,* Vol. 24, pp. 661-665; June, 1932.

The physiological response of the horticultural product to external stimuli is important in developing the technology of freezing preservation. Apparently ice formation occurs in the intercellular spaces of plant tissues at the low temperature commonly used in freezing preservation. The aim of the research of the laboratory now is to evaluate the main factors apparently involved in low-temperature preservation—osmotic activity, temperature effect and ice formation in tissues—and to integrate their useful properties in a practical method of freezing preservation at moderate freezing temperatures.

* * *

RIPENING CHEESE IN A SEALED PACKAGE. L. A. Rogers. *Journal of Dairy Science,* Vol. 15, No. 3 (May, 1932), pp. 185-190.

Cheddar cheese when canned direct from the press ripens normally without loss of moisture, formation of rind, or growth of mold. Cans used must seal tight to exclude all oxygen of the air, which will permit mold growth; yet provision must be made for escape of gas during the ripening of the cheese to prevent swelling and probable bursting of the can. A modified bunsen valve in the head of the can controls gas pressure inside the can and keeps air out. For 1-lb. prints a No. 3 can, which has an inside diameter of $4\frac{1}{16}$ in. and a height of $2\frac{13}{32}$ in., gives a $\frac{1}{8}$-in. space between can and cheese, which is space enough for hoops having $3\frac{13}{16}$ in. inside diameter. These hoops may be 14 in. long and are more easily filled than hoops for No. 2 or No. $2\frac{1}{2}$ cans. Decreased loss of weight through evaporation, elimination of paraffining, and simplified care of the cheese in the curing room offsets largely the cost of canning the cheese. (U. S. patent No. 1,842,365, issued Jan. 19, 1932, and assigned to the public, covers this method.

THE CHEMISTRY OF THE COFFEE BEAN. I—COFFEE-BEAN OIL. R. O. Bengis and R. J. Anderson. *Journal of Biological Chemistry,* Vol. 97, pp. 99-113; July, 1932.

The unsaponifiable fraction of the fat extracted from freshly roasted coffee contains a highly unsaturated, strongly optically active, and sensitive product which the authors designate by the name "kahweol," together with one or more sterols. Other chemical properties of the material are described.

* * *

REFRIGERATION TECHNIQUE. Von R. Linde and others. *Zeitschrift des Vereines Deutscher Ingenieure,* Vol. 76, pp. 569-600; June 11, 1932.

A series of articles on this subject includes the following plant design for use of ammonia compressors for refrigeration gases: large cooling machines using ammonia absorption system; rapid freezing of foodstuffs by contact with gaseous cooling agents, with especial reference to carbon dioxide; decomposition of gas mixtures and technical problems of refrigeration; report on the research of the Imperial Institute on the low-temperature region.

* * *

IRRADIATED ERGOSTEROL. H. Steenbock, S. W. F. Kletzien and J. J. Halpin. *Journal of Biological Chemistry,* Vol. 97, pp. 249-264; July, 1932.

Ergosterol and yeast when activated antirachitically by ultra-violet radiations are inefficient sources of vitamin D for the chicken. Whereas 1 per cent of cod liver oil of average potency resulted in normal bone production, it required from 40 to 120 per cent cod liver oil equivalence as irradiated ergosterol and from $7\frac{1}{2}$ to 60 per cent cod liver oil equivalence as yeast to produce the same result. The vitamin D produced by ordinary irradiation of ergosterol with a quartz mercury vapor lamp is a different substance from that found in cod liver oil.

* * *

THE INFLUENCE OF SWEETENED FROZEN CREAM ON THE DEVELOPMENT OF SWELL IN ICE CREAM. Walter V. Price. *Journal of Dairy Science,* Vol. 14, No. 3, pp. 221-228.

Ice cream mixes containing sweetened cream as the only source of milk fat possess better whipping properties than mixes made from non-sweetened frozen cream. Sweetened cream frozen at —15 deg. F. for 48 hours gave results which corresponded quite favorably with those given by unfrozen cream. Invert sugar and sucrose used in the proportions of one part sugar solids to ten parts cream were equally effective for sweetening cream for storage at —15 deg. F. for 14 days. Egg yolks frozen for 48 hours at —15 deg. F. and containing 1.33 parts of invert sugar for each ten parts of egg yolk by weight produced a greater swell in ice cream than did unsweetened frozen egg yolk and still greater swell than did no egg yolks at all. This indicates a possible relationship between lecithin and the swell in ice cream. Previous experiments had shown that the mixing of sugar with egg yolks prevented the separation of lecithin during freezing.

* * *

THE RESPIRATION OF CITRUS AS AFFECTED BY HYDROCYANIC ACID GAS FUMIGATION. A. C. Shill. *University of California Publications in Agricultural Sciences.* Vol. 5, No. 5; pp. 167-180.

Citrus seedlings subjected to hydrocyanic acid gas in a specially designed fumigatorium indicated an initial increase in respiration. This increase averaged about 75 per cent for 1 to 7 hours after fumigation over that for 6 to 24 hours before fumigation. After about 35 hours, respiration returned to approximately normal, indicating that with the dosage used there is no permanent toxic effect of the gas on the trees. Throughout the tests photosynthesis was prohibited by darkening of the respiration chamber.

* * *

THE RELATION OF DETERIORATION OF ORANGE JUICE TO ITS IODINE REDUCING VALUE. M. A. Joslyn and G. L. Marsh. *Science,* July 22, 1932; p. 82.

Direct titration decreased from 20 to 25 c.c. of 0.01 N iodine per 50 c.c. of pasteurized or benzoated juice to less than 2 c.c. during storage and indicates the extent of browning and of the general deterioration in quality during storage. Iodine reducing substances in fresh orange juice were not noticeably changed by the manner of extracting the juice, by the quantity of suspended pulp, by de-aeration, or by heating. Maturity of Valencia and navel oranges is not a significant factor. This iodine reducing material has been shown to be largely hexuronic acid and to be identical in chemical and physical properties with a pure crystalline vitamin C preparation.

* * *

HYDROGENATION OF FATS. T. P. Hilditch and others. *Chemistry and Industry,* Vol. 51, pp. 195-203T; June 24, 1932.

Study of the influence of catalyst concentration on the selective hydrogenation of cottonseed oil shows that the selectivity is greater at higher temperatures and also with the greatest amount of catalyst. Data presented show: (1) the products formed during the course of hydrogenation of cottonseed oil by the Bolton-Lush continuous hydrogenation process (drip method), and (2) the relative quantities of solid and liquid oleic acids present at different stages of the hydrogenation.

* * *

METHYL BROMIDE AS A REFRIGERANT. *Ice and Cold Storage,* Vol. 35, pp. 123-127; July, 1932.

A comprehensive table of the properties of saturated vapor of methyl bromide at various temperatures includes the following: absolute pressure, volume of liquid and vapor, density of liquid and of vapor, heat content and entropy values. Details of this study have been published in the April, May and June numbers of the same publication.

Men, Jobs and Companies

INDUSTRY

BALTIMORE BUTTERINE CO., Baltimore, and the Olsen Food Products Co., Kansas City, manufacturers of vegetable shortening compound, have brought suit against the Bureau of Internal Revenue, charging that the government has caused dealers to cancel their contracts by trying, since 1927, to collect taxes and license fees that, prior to July, 1931, were applicable only to oleomargarine.

GOLDMAN-SACHS TRADING CORP., New York, has been sued through its officers, by the Wilkay Corp., William Klein and the Torquay Corp. for an accounting and for the appointment of a receiver. It is alleged that the corporation put $12,500,000 of its funds into the Frosted Foods Corp. and then wrote off the entire investment on its books on Dec. 30, 1930; that the Frosted Foods plant had not been sufficiently tried out to warrant the investment; and that the trading corporation took over from the banking firm of Goldman-Sachs & Co. bonds, debentures and stocks of doubtful value. Walter E. Sachs, Waddell Catchings and Sidney J. Weinberg are being sued as members of the banking firm and as officers of the trading company. There are ten other defendants.

HERSHEY CHOCOLATE CORP., Hershey, Pa., is adding a new building to its plant at a cost of about half a million dollars.

KIBBE BROTHERS, Springfield, Mass., recently acquired from Walter M. Lowney Co. all copyrights, patents, trademarks and trade names. Walter H. Belcher, who spent 32 years in Lowney's service and one year with Kibbe, has been put in charge of sales of the Lowney and Kibbe line.

THE CHARLES N. MILLER CO., Boston, has taken over the copyrights, trademarks and boxes of Samoset Chocolate Co. and has acquired physical assets of the Nobility Chocolate Co. J. H. Daugherty, for several years with Samoset, will be president and sales manager of the Samoset unit of the Miller concern. The name of this unit will be Samoset Chocolate, Inc.

THE NUNNALLY CO., Atlanta, Ga., one of the oldest candy manufacturers in the South, has merged with the Hollingsworth Candy Co., Augusta, Ga., and the combine will be known as the Fine Products Corp. Mayonnaise and other table delicacies will be added to the company's line of products. Virgil Hollingsworth, president of the Augusta concern, will be the head of the new company.

PENNSYLVANIA STATE COLLEGE, State College, Pa., dedicated its new dairy husbandry building Aug. 25-26 with educational exhibits and talks by leaders in the ice cream and dairy industries. The official presentation of the building was made by Governor Pinchot, who is an ex-officio member of the board of trustees of the college.

THE PFAUDLER CO., Rochester, N. Y., is installing oil-fired muffle type furnaces which will accommodate an all-welded piece of 10,000-gal. capacity, so that it may supply industries with large tanks for storage and transportation of their products. All-purpose traveling cranes also are being installed, and other improvements are being made which involve an expenditure of between $200,000 and $250,000.

TEXAS SUGAR REFINING CO., Texas City, faces receivership as a result of a petition by Peabody, Houghteling & Co., Chicago, on the allegation that the Texas company had failed to pay a promissory note for $75,000 executed February, 1929, and payable three years from date.

TRI-VALLEY PACKING CORP. has recently been incorporated by a group of former executives of the California Cooperative Canneries, taking over the Modesto, San Jose and Visalia plants of Cooperative Canneries. George N. Pfarr is president of the new organization. General offices of the concern will be in San Francisco.

PERSONNEL

CHARLES E. ANDERSON has resigned as vice-president, director and general sales manager of Loft, Inc., and Happiness, Inc., and will leave for Europe, where he will make a survey of prominent candy-restaurant firms. Mr. Anderson's European survey apparently will be a study of the liquor side of the business, for he recently made this statement: "With the possible advent of light wines and beer, the restaurant business will be in a particularly advantageous position if it is abreast of how the American taste has been catered to in Europe during our prohibition era."

J. M. BAILEY recently resigned from the Detroit Creamery Co. to acquire the Dixie Ice Cream Co., Fort Wayne, Ind. His production manager will be George Degraw.

JOHN J. BALLWEG, president of Novia Candy Co., Brooklyn, N. Y., has been appointed chairman of a special exposition committee of the National Confectioners' Association. This committee will work out a method of handling the 1933 exposition of the association that will have the support of the exhibitors.

F. H. BENNETT, National Biscuit Co., has been transferred to the production department and has assumed supervision of the Wheatsworth bakery and the Hamburg mill. The biscuit company has also appointed the following to managerships: C. H. Trelawny, Des Moines (Iowa) bakery; F. W. Teufer, Houston (Texas) bakery; R. L. Pflieger, McLaren Cone Co., Dayton, Ohio; J. E. Ruch, Cincinnati (Ohio) bakery; and T. W. Bugler, Minneapolis (Minn.) bakery.

P. A. DETT, formerly plant manager for Armour & Co. at South St. Joseph, Mo., has been moved to Chicago, where he is assistant to H. C. Mills, general manager. K. V. SMITH, Milwaukee, has been named plant manager to succeed Mr. Dett. FRANK WARD has been made superintendent of the hog-cutting department.

JOHN L. FORTUNE, founder and president of Fortune-Zerega, macaroni manufacturers, of Chicago, retired recently, having sold out to his associates. Frank L. Zerega has been elected president to succeed Mr. Fortune.

CHARLES KALBITZER was recently made manager of the Wheeling (W. Va.) plant of Hygrade Food Products Corp. to succeed Frank Regan, who has been transferred to Boston.

J. A. MARTIN, formerly with the Kroger chain, has been named general manager of the Wesco Foods Co., Chicago.

P. W. SCHAED, former general manager of the central division of Best Foods, has been promoted to general manager of the company with headquarters at New York City.

JOHN TELL was recently made district manager of the Texas district of Armour & Co. This change in personnel accompanied the combination of two Texas offices with headquarters at Fort Worth.

JOSEPH L. WILDE, Chicago meat packing specialist, known for his inventions and for the creation of new meat products, has been retained by the J. Fred Schmidt Packing Co., Columbus, Ohio. Mr. Wilde will have complete supervision of the company's packing process as a part of its campaign to improve all departments of its business.

DEATHS

JOHN ANDERSON, formerly chief engineer of Hormel Co., Austin, Minn., died recently, and his position will be filled by his son, Elmer Anderson.

ROBERT M. BROOKES, 58-year-old manager of Armour & Co. cheese department, Chicago, died recently at his office. Mr. Brookes had spent 35 years with Armour & Co.

CLINTON GOODLOE EDGAR, Brigadier General, who was managing partner of W. H. Edgar & Son, Detroit, and president of the Edgar Sugar House, died in Paris Aug. 9. He was 58. During the War, General Edgar was in charge of construction of buildings for the air service.

DOMINGO GHIRARDELLI, retired president of the chocolate and cocoa manufacturing company which bears his name, died Aug. 9 at the age of 83. Mr. Ghirardelli came here from Lima, Peru, and he spent practically his entire life in the chocolate company. His concern was one of the largest and most important on the Pacific Coast.

EUGENE KAHN, second vice-president and one of the founders of the Cincinnati packing company bearing his name, died Aug. 17 of heart disease. Mr. Kahn was 66 years old and was a native of Germany.

WILLIAM SCHULZE, 65-year-old treasurer of the Schulze Baking Co., Chicago, died recently. Mr. Schulze had been a prominent figure in the baking industry for several years.

HERMAN WIRSHING, managing director of the Puerto Rican-American Sugar Refining Co., died recently at San Juan, following an operation.

CECIL G. WOOD, 38-year-old editor of *Bakers Review* and *The Refrigerating World*, died of heart disease Aug. 6 at his home in Millburn, N. J.

THIS MONTH—

SEPTEMBER

12-14—National Coffee Roasters' Association, Denver, Colo.

21-23—American Fisheries Society, Lord Baltimore Hotel, Baltimore, Md.

26-27—National Poultry, Butter and Egg Association, Hotel Sherman, Chicago, Ill.

26-28—Bread and Cake Bakers' Association of Canada, Royal Oak Hotel, Toronto.

27-30—Association of Dairy, Food and Drug Officials of the United States, Gibson Hotel, Cincinnati, Ohio.

—National Association of Bakers' Supply Houses, Detroit, Mich.; Donald W. Boyd, Secretary, 304 Michigan Ave., Buffalo, N. Y.

An increase of 1 cent a quart in the milk price has added $1,600,000 monthly to the buying power of the New England dairy farmer. Incidentally, the buying power of the New England farmer now exceeds the value of the present output of the factories in that famed industrial section.

Hors d' Oeuvres

THE COUNTRY may still be dry, but there's enough moisture to float brewery stocks. And 300,000 shares are offered at $2 a throw by a Wall Street promoter. This block is part of the 1,000,000-share option granted by Jetter Brewing Co., Inc., Omaha.

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TOMATO JUICE is more than an appetizer to the Virginian. In Richmond there is a popular demand for it on Saturday and Monday mornings as a cure for that hang-over headache. Which reminds us, for no reason, that Wayne County vinegar is being advertised as a "tan—don't burn" agent and that sparkling clear fruit juices that may be carbonated or blended are announced.

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IT APPEARS that the lowly salmon is due to become the king fish, what with the discovery that it contains 60 to 80 per cent as much vitamin D as cod liver oil and with the development of a machine for skinning it before canning. Credit for the skinner goes to G. P. Halferty, Seattle, and W. S. Schlothan, Ketchikan, Alaska.

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ANOTHER FOOD designed to offer yeast in a tasty form will soon be on the market. In New Orleans, a company has been formed to make a breakfast cereal incorporating yeast and bran. Another new food is kelp bread that contains iodine.

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THE PRIZE for the organization with the most appropriate name goes to The Beauviners, a new dairy club in Detroit. Its officers comprise a Herd Sire, Junior Herd Sire and Stable Boy, respective equivalents of president, vice-president and sergeant-at-arms.

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IF BEER returns, a stein, or more, may be had at most any corner. Chains of allegedly "convertible" soft drink and sandwich shops are occupying corner sites in Pittsburgh, St. Louis and Chicago. "N and Out" and "Brass Rail" designate some of them.

What Food Men Are D

Fear Trademark Piracy—Coffe Short
Policy Made Clear—Packer Finan
Carry On—Kellog Sued

TRADEMARK piracy on Canada's highways of commerce is feared by domestic manufacturers distributing in that country. The cause of the consternation is a new statute enacted by Canada and scheduled to become effective Sept. 1. The new law stipulates that the title to a trademark is conferred by registration and that the user of a trademark who registers first is given the right to prevent an earlier user, who has not registered, from continuing the use of his mark. Contrary to common-law usage, the Canadian measure provides that ownership is determined by priority in registration alone.

Moreover, the registration must cover all classes of goods for which the owner may want to use the trademark in the future; otherwise it may be appropriated by others for products not specified in the owner's application. Those who advertise in magazines of Canadian circulation but do not distribute in Canada are, in particular, warned to watch their step.

COFFEE roasters are faced with the prospect of being short of raw material. Using coffee as their principal weapon, the Brazilian rebels closed the port of Santos, through which most of the coffee flows, stopping the usual shipment of 100,000,000 lb. a month. When the blockade became effective at the middle of August, there were estimated to be about 680,000 bags of coffee in the United States, exclusive of 1,050,000 bags held by the Farm Board. This supply is consumed at the rate of 1,000,000 bags a month, but only half of the coffee used comes from Brazil. Following the release of 132,000,000 lb. of coffee Sept. 1, authorities say the supply will last until the middle of October.

The Farm Board requested the government of Brazil to modify the contract that restricts the Board to the release of 63,500 bags a month, but the plea was denied.

REFRIGERATOR- and tank-car service for food manufacturers and distributors at rates that should be considerably under what it costs to own and operate private cars is now available on a large scale through the rolling stock amassed by the General American Tank Car Corp. This concern is now operating a fleet of 30,000 tank cars, many of which it has obtained from the food industry. Five hundred of the cars have just been purchased from Armour & Co. and 200 from Penick & Ford, Ltd. And only recently, the refrigerator and tank cars of Swift & Co. were acquired. All three purchases were made with the provision that General American will lease to the companies all of their tank-car requirements for a period of years.

The favorable rates offered by the car company are made possible by its large pool of equipment and by nation-wide organization which enable it to minimize hauling of empty cars, as is usually necessary on return trips of privately owned rolling stock.

GOVERNMENT seizures of food products will not be contested at the expense of the National Canners' Association, nor will the organization pay the fees of lawyers employed for that purpose, it has been announced. However, the association will, in accordance with its consumer complaint service, investigate such seizures and will advise the canner, if requested to do so. In the event there appears to be an injustice or mistake in the official action taken, the association will make appropriate representation to the officials concerned.

MEAT PACKERS in Chicago—namely, Armour & Co. and Cudahy Packing Co.—are financing a plan for the fattening of Southwestern cattle on the abundant crops of the Middle West. Already, 14,000 Herefords from Kansas and Oklahoma ranges have been placed on farms in central Illinois.

The plan calls for payment to the farmers of 8 cents a pound for weight added to the cattle, a reimbursement estimated to be equivalent to 40 cents a bushel for corn. By this arrangement, the packers are insured of a supply of beef and the Illinois farmers who are unable to buy cattle will have an opportunity to market their grain on the hoof.

FARMERS in the West have taken a page from the book of mine and textile laborers. Early in August, a handful of men from the farms around Sioux City, Iowa, struck for higher prices, blockading the highways to prevent trucks from transporting livestock, milk and other produce into the city. As the movement went into its third week, it appeared to be spreading despite the fact that all odds were against its attaining any notable success. Omaha and Lincoln, Neb., were being picketed and there were indications that the strike would be extended to Madison, Wis., and St. Paul, Minn. Even New Jersey farmers have considered an attempt to block the flow of food to New York and Philadelphia. However, the strike was weakening in scattered sections, and following the stopping of a train at Emerson, Neb., federal authorities indicated they might intervene.

Some of the dairymen have profited by the strike, at least temporarily. In Sioux City, distributors and producers met to consider a projected price rise from 80 cents per 100 lb. to $1.80. At Omaha.

Doing and Saying

Short—Car Services Available—Finance Feeding—Strikers Sued—Crops Drop

the price went up from $1.45 to $2 and bottled milk jumped from 8 to 9 cents a quart. At Lincoln, the price rose from $1.40 to $1.80 per 100 lb.

SHREDDED WHEAT is the storm center of litigation today, with National Biscuit and Kellogg companies on opposite sides. In 1927, Kellogg began to make shredded wheat biscuits, called them Shredded Wheat, and sold to the trade. The former Shredded Wheat Co. soon began action in Connecticut against dealers and the W. K. Kellogg Co., but the case was withdrawn by Shredded Wheat on representation of Kellogg that the latter would abandon the term "shredded" on its product.

In December, 1928, National Biscuit Co. purchased Shredded Wheat Co., whose principal product had been on the market since 1893. It is now alleged that Kellogg has continued to manufacture shredded wheat biscuits, and merchandise them as such. National Biscuit recently began an action in Delaware to secure service on Kellogg, a Delaware corporation, claiming unfair competition. Kellogg answered the claim early in August and at the same time filed two suits in the U. S. District Court in New York, charging violation of the Sherman Anti-Trust Act and asking triple damages totaling $3,000,000. None of the cases has yet come to trial.

MARKET SUPPLIES of beef, pork and lamb in the United States during the coming year probably will be smaller than in the current marketing year, government statistics indicate. In Europe, all the important hog-producing countries showed a decrease as of June 1, and the drop amounted to 10 per cent in Germany, Denmark and the Netherlands, as compared to the same period last year. Prospects in Canada also point to a decrease.

There were about 5 per cent fewer cattle on feed for market in the corn belt states as of Aug. 1 than at the same time in 1931, despite the forecast of the largest corn crop in history. Moreover, shipments of stocker and feeder cattle into the corn belt section during the six months ending July 1 were only 71 per cent as large as in the corresponding period last year. The shipments for this six-month period are the smallest in thirteen years.

The decline in the lamb crop for 1932 is placed at 8 per cent as compared with the 1931 crop. The total production for this year is estimated at 29,717,000 head.

CROP prospects suffered a widespread decline during July, according to the Department of Agriculture. Estimated production of corn was decreased 6 per cent during the month, and that for wheat, barley, rye and potatoes from 3 to 4 per cent. Rice and sugar cane are the only field crops showing prospects for yields materially larger than the average. Canners of snap beans may run short of raw material, for the 1932 crop is placed at only 44,170 tons, or 37 per cent below the estimated production last year.

Wheat presents a complex picture. Although production in the United States will be about 20 per cent under that of 1931, this decrease is offset by Canada to give an average of 98.5 per cent for the three North American countries. And world production of wheat, on the basis of reports from 33 countries, is about the same as that of last year.

Members of Dr. Herbert Spencer Dickey's Andes-Amazon expedition loading paper-packaged supplies into native boats for a trip up the Napo River. Constructed with an inner film of odorless asphalt, the paperboard containers kept the supplies in good condition during four months in the frosty Andes and the tropical, insect-infested jungles.

Commercial stocks of domestic wheat as of July 30 totaled 179,053,000 bu., as compared to 173,133,000 bu. on July 23 and 235,727,000 bu. a year ago. There were also 4,707,000 bu. of Canadian wheat stored in United States markets on July 30, as against 6,244,000 bu. a year ago. Stocks of other grains as of July 30, in bushels, are as follows: Corn, 11,207,000; oats, 13,748,000; rye, 8,958,000; barley, 3,448,000. Stocks one year ago were: Corn, 8,363,000; oats, 8,021,000; rye, 9,838,000; barley, 6,568,000.

—AND THE NEXT

OCTOBER

3-7—American Bakers' Association, Hotel Sherman, Chicago, Ill.

3-7—Twenty-first Annual Safety Congress and Exposition, Wardman Park and Shoreham hotels, Washington, D. C.

4-6—National Cooperative Milk Producers' Federation, Hotel St. Francis, San Francisco, Calif.

17-19—International Association of Milk Dealers, Statler Hotel, Detroit, Mich.

17-22—Dairy Industries Exposition; Dairy and Ice Cream Machinery and Supplies Association, Convention Hall, Detroit, Mich.

20-22—International Association of Ice Cream Manufacturers, Book-Cadillac Hotel, Detroit, Mich.

24-26—Mayonnaise Manufacturers' Association, Kenmore Hotel, Boston, Mass.

24-27—American Public Health Association, Hotel Willard, Washington, D. C.

Concentrates

Extended youth and a general advance in health can be effected by foods rich in vitamin G, Prof. H. C. Sherman, of Columbia University, declares . . . "Frozen canning," in which fruits are preserved by freezing in an alcohol bath, is being developed at Stanford . . . A Wisconsin baker recently kept bread fresh for four weeks by freezing it . . . Subjecting grapes to carbon dioxide before placing them in refrigerator cars prevents much of the commonly experienced shattering in transit, Department of Agriculture scientists find . . . Formation of lumps in sugar can be prevented by adding calcium phosphate to it, a member of American Chemical Society asserts . . . Important to food consumption in the home is the fact that the proportion of the male population married between the ages of 20 and 24 increased from 18.9 per cent in 1890 to 28.1 per cent in 1930 . . . Popular demand for uncooked pastry is increasing steadily in London . . . Cuba's sugar exports to countries other than the United States increased 54 per cent in the first seven months of the year . . . Production of self-rising flour amounted to only 2,779,000 bbl. during the first six months of the year, compared to 4,003,000 bbl. for the same period last year . . . Leading cottonseed oil refiners and manufacturers have organized the Institute of Cottonseed Oil Foods to promote their products . . . The Salinas-Watsonville district in California has advanced in ten years from zero in lettuce production to the point where it now grows half of the country's supply . . . Good quality cheese can be made from frozen milk by a slight modification in the manufacturing process, New York State Experiment Station has discovered . . . By precooling fruit before placing it into refrigerated cars, the number of car icings between California and the East can be reduced from ten or twelve to one with a saving of $30 per car (for oranges) . . . Artificial drying of rice, which seldom contains less than 25 per cent moisture when harvested, is a practical means of raising the grade of the product, the Department of Agriculture has determined.

BUSINESS TRENDS

Chocolate, Sugar and Rice Manufactures Drop

Declines in the value of products manufactured in the chocolate, sugar and rice industries are shown by comparison of the Census of Manufactures for 1929 and 1931. Chocolate and cocoa took the biggest drop, the total value of the products being $86,002,652, in 1931, or 28.1 per cent less than two years previous. There were nine fewer establishments, or a total of 50, and 10.2 per cent less wage earners, the number being 5,610. Wages were down 15.5 per cent. But the most significant item is an increase of 2.1 per cent in the value added to the products by manufacture.

Cane-sugar industries produced manufactures valued at $13,981,709 last year, which is 23.7 per cent less than for 1929. The number of establishments was 68, compared to 70 two years before, and wage earners numbered 2,032, a decrease of 12.4 per cent. Likewise, wages dropped 18.9 per cent. Unlike the cocoa industry, the cane-sugar producers added only $3,973,266 to their raw products in 1931, or 34.9 per cent less than in 1929. The value of beet-sugar industry manufactures in 1931 was $85,672,749, a decrease of 21.1 per cent. The value added by manufacture was down 37.9 per cent, the number of wage earners was 16.7 per cent less.

The total production of cleaned rice in 1931 amounted to 1,257,414,042 lb., valued at $38,222,122, an increase of 1.2 per cent in quantity and a decrease of 17.1 per cent in value as compared with 1929. The total value of products in this industry was $40,140,914, or 17 per cent less than two years earlier. Other declines indicated were 6.2 per cent in the number of wage earners, 12.6 per cent in wages, and 17.9 per cent in value added by manufacture.

Business Improves

A sustained upward trend in commodity prices is giving business an optimistic aspect. Late July prices of food commodities, which fluctuated at slightly lower levels, at present are showing strength. A bullish stock market reflects hopeful indications that the corner has definitely been turned. Other domestic and foreign factors are as yet having no material effect upon general business conditions, although the psychological influence is healthful.

The Business Week index of general business activity for the week ending Aug. 20 stands at 53.3 per cent of normal, as compared with 55.6 per cent for the week ending July 23; building is the chief depressing factor. Wholesale prices of all commodities, as reported by U. S. Department of Labor, have risen 1.4 per cent for the four-week period ending Aug. 20. Food prices advanced 1.3 per cent. A weighted price index shows a rise of 3.91 per cent on all commodities and one of 8.1 per cent on food for the week ending Aug. 20, as compared with that of July 23.

A. & P. tonnage sales for July were 3.93 per cent below those of July, 1931, as compared with a decrease of 4.06 per cent for June.

BASIS FOR THE CURVES

Retail food prices, factory employment, factory payrolls and wholesale prices are based on indexes of the Department of Labor. Cost-of-living index is that of the National Industrial Conference Board. Electrical power consumption figures are furnished by *Electrical World*.

Agreements Made at Ottawa Affect American Trade

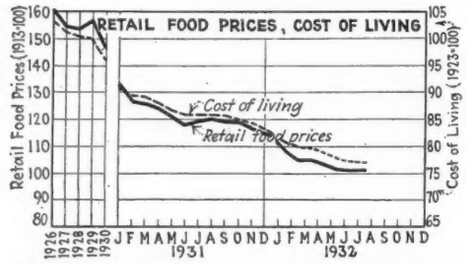
Exports of American food products to the British Empire apparently suffered some sort of a blow at Ottawa, but, in the absence of details, it is impossible to determine the extent of the damage. Reports have indicated that some 220 American products (in all industries) will be affected and that the trade of this country will suffer as much as $75,000,000.

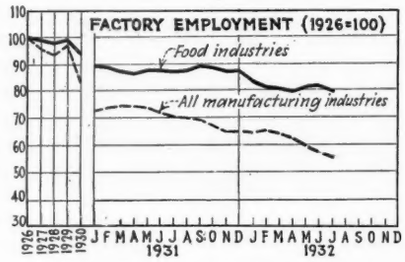
It is known that Great Britain granted preferential tariffs on the following food products: Wheat from Canada and Australia, 6 cents a bushel; dairy products, eggs, poultry and pork from Canada, Australia and New Zealand; mutton, lamb and beef from Australia and New Zealand; and wines and some fruits from Australia and South Africa. And in return for these favors, the dominions will give new preferences to manufactured products from Great Britain.

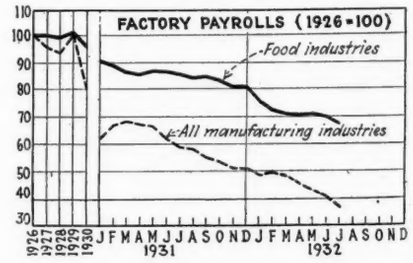
Companies Earn Dividends

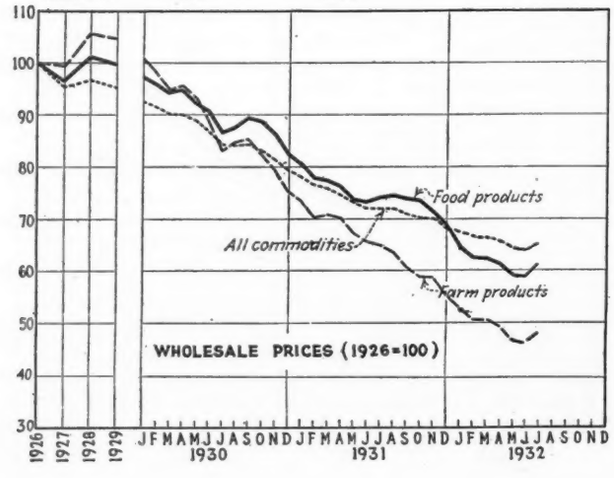
Despite extremely low prices for the first six months of the year, 48.2 per cent of 26 food companies reporting net earnings for that period, as received between June 1 and Aug. 1, earned their dividends. Five of the companies showed increased earnings compared to the corresponding period of 1931, and only two indicated small net losses for the period of the reports.

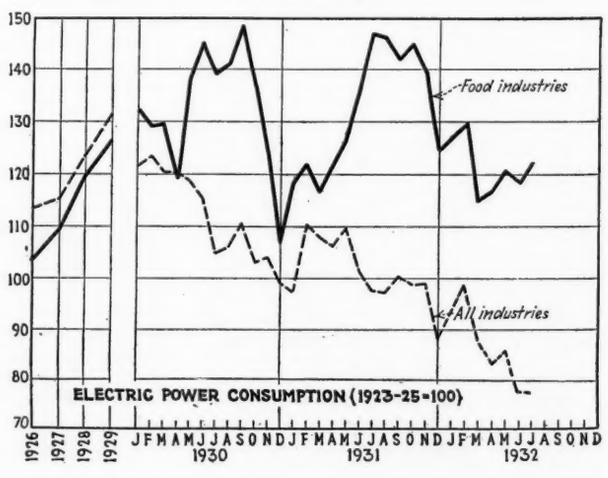
And more "good news" is brought to light in an analysis of the Aug. 12 summary of cold-storage holdings, issued by the Bureau of Agricultural Economics. Of a total of 39 items listed, 27 showed a decrease compared to the five-year average, and 27, which are mainly the same ones, registered a decrease as against 1931.







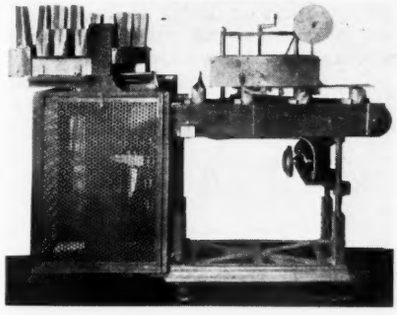




NEW EQUIPMENT FOR FOOD MANUFACTURERS

Unit Seals Roll-Top Bags With Tape of Any Kind

Coffee, flour, cereals, candy and other food products may be sealed in lithographed kraft or transparent cellulose bags with either kraft gummed, Scotch cellulose or decorator's tape by a machine developed by Tape-O-Matic Machine Co., 50 Columbia St., Newark, N. J. The machine is entirely automatic, creasing the bags for folding and then producing a double or triple fold. It is adjustable, and the one illustrated will handle bags of sizes ranging from 8 to 16 oz. These adjustments may be made in 10 seconds, it is said.



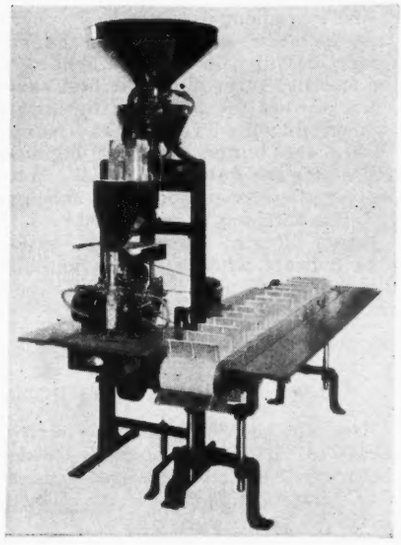
Since the machine is portable, it may be conveniently used in connection with automatic scales, and the operator of the scale can take care of packaging as well.

The Tape-O-Matic sealer will handle 30 bags per minute with cellulose or decorator's tape and 25 per minute with kraft tape. It is a self-contained unit, being equipped with a motor and gear reducer. The motor has a high starting torque to eliminate lag on starting. The machine weighs about 800 lb. and is 6 ft. 8 in. long, by 4 ft. 8 in. high and 19 in. wide.

Unit Weighs and Packages Delicate Products

Frail products are said to be packaged rapidly and without injury by the combination automatic weigher, paddle conveyor and cellophane bag opener developed by the Triangle Package Machinery Co., Chicago, Ill. With this equipment, an operator feeds the bags in the "flat" to the bag opener, which pulls the sides apart by vacuum. The weighing machine delivers a constant feed of material to fill the bags and the conveyor carries the packages to the closing operation.

The machine is designed especially for handling candies, nut meats, and similar frail products. The weigher is particularly suited for filling cellophane bags, and is so constructed that it screens small pieces and surplus sugar from the weighed loads automatically.

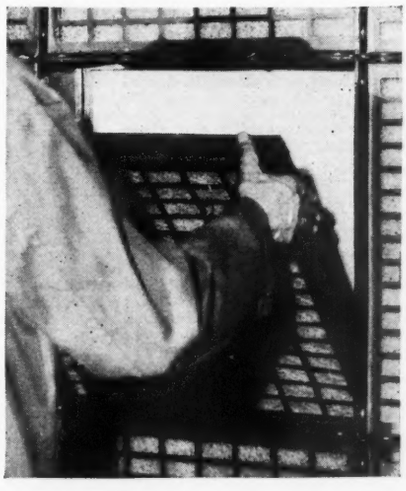


The equipment is said to be easily and quickly adjustable for different sizes of packages.

According to manufacturer's specifications, the packaging machine will make from 15 to 25 weighings per minute and will handle loads varying from 4 to 16 oz. The machine has an over-all height of 7 ft. 8 in. and, with the conveyor attached, occupies a floor space of 4½x7 ft.

Glass-Fiber Air Filters Replaced When Dirty

Air filters made of glass are a new development of Owens-Illinois Glass Co., Toledo, Ohio. This novel air-cleaning unit, called the "Dustop" consists of a closely packed mass of fine, twisted, viscous-coated glass fibers. These are held in a paper container which has grilled faces to permit the free passage of air.

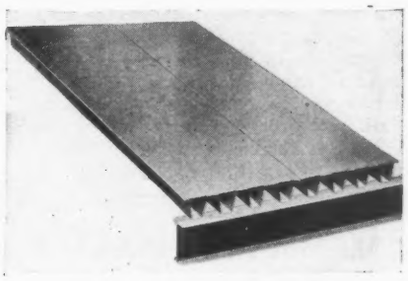


In their standard form the glass filters are 2 in. thick and weigh 2 lb. They are installed in pairs and may be set up in banks where a large volume of air is to be filtered. When the units become filled with dirt, they are not cleaned but are replaced with new ones, the cost of the change being less than the expense involved in cleaning ordinary filters, it is asserted.

The glass filters are designed to have low resistance to the passage of air and at the same time to effect certain capture of foreign particles. The latter is accomplished by extensive twisting and tangling of the fibers.

All-Steel Flooring Laid Directly on Beams

All-steel flooring which is laid directly on the supporting beams has been developed at Mellon Institute of Industrial Research by the research staff of H. H. Robertson Co., Pittsburgh, Pa. This new flooring is made in sections 24 in. wide and up to 12 ft. 5 in. in length. It consists of a flat sheet of steel welded to a supporting section preformed into keystone-shaped parallel channels which are 6 in. from center to center. These channels readily accommodate conduit for electrical outlets.



The flooring is installed simply by putting it into place across the structural members and bolting, clipping or welding it fast. This arrangement, it is asserted, effects savings in building construction costs on account of the decreased load-carrying requirements of the floor slabs, columns and foundations.

Light-weight, fireproof construction and adaptation to a variety of finishes and to the installation of suspended ceilings and service piping are other attributes of the steel flooring.

Inefficient Carburetion Detected by Meter

Operators of fleets of motor cars can quickly and accurately determine whether the carburetors of their vehicles are set too "rich" or too "lean"—that is, whether gasoline is being wasted or power sacrificed—by an Air-Fuel Ratio meter developed by Charles Engelhard, Inc., Chestnut St. and N. J. R.R. Ave., Newark, N. J. This is accomplished by passing a portion of the exhaust gas through the meter after the motor has "warmed up." When this exhaust gas reaches the analysis cell of the instrument, a pointer is deflected over a wide scale to indicate the exact nature of the mixture.

The meter operates on the Wheatstone bridge principle, comparing the thermal conductivity of the exhaust gas against that of air. Inasmuch as there is a

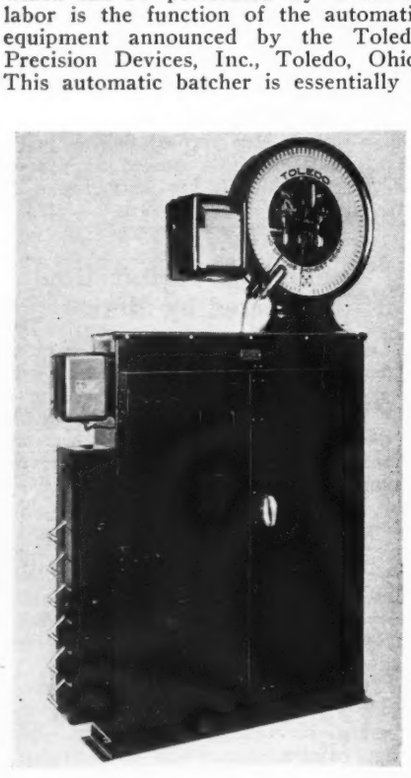
direct relationship between the thermal conductivity of the exhaust gas and the air-fuel ratio of the carburetor, the scale of the meter is calibrated directly in pounds of air per pound of gasoline burned. The instrument is portable and is said to be easy to handle and operate, and some of its users have obtained large savings in fuel by correcting the carburetors according to its readings.

Machine With Electric Eye Will Batch Materials

Batching of materials by a simple cycle of lever and button operations which can be performed by unskilled labor is the function of the automatic equipment announced by the Toledo Precision Devices, Inc., Toledo, Ohio. This automatic batcher is essentially a Toledo scale equipped with a photo-electric tube, a lever system and a set of beams, there being one beam for each ingredient that enters the mixture. These beams are regulated by a system of hand levers on one side of the scale, and the flow of material is controlled by push-buttons. When the desired weights have been placed on the scale, the photo-electric relay stops the flow and a graphic recorder makes a record of the quantity of the ingredient used.

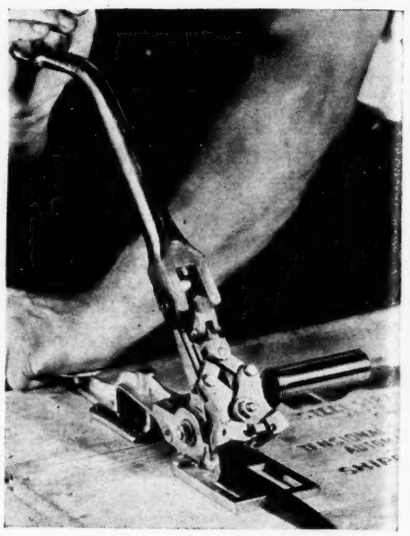
In operation, each beam is set for the correct quantity of the ingredient. Then, the operator turns down the first handle, which throws the beam for the first ingredient into the lever system. Next, he pushes the button for that ingredient and starts the flow of material. By repeating these operations for each material, the batching is completed.

Lights located beside the pushbuttons indicate when a certain ingredient is flowing and also how many have already entered the mixture.



"Two-In-One" Strapper

Two separate tools were formerly required to perform the operations done by the strapping machine developed by Signode Steel Strappng Co., Chicago, Ill. This tool brings the overlapping ends of steel strapping together under tension and locks and seals them. This is accomplished by the manipulation of two handles. Two or three movements of one places the desired tension on the strapping, and a forward stroke of the other crimps the snap-on seal to form a lock.



Uniformly good results and a saving of 25 to 30 per cent in time are advantages attributed to the new tool.

THE MANUFACTURERS OFFER

Refrigerating Equipment—Information of interest to food manufacturers is contained in five booklets by York Ice Machinery Corp., York, Pa.: Ammonia Ice Cream Freezers; Better Ice Cream; Clean, Dry Milk Rooms; Refrigeration and Air Conditioning for the Bakery; and Automatic Water-Cooling Units for Bottlers.

Quick-Freezing—The Z Process for quick-freezing is described and the equipment for applying it is illustrated in a 4-page bulletin of Frick Co., Waynesboro, Pa., which is now supplying this equipment to the industry. Another 4-page bulletin by the company describes its line of float valve controls.

Steam-Cylinder Lubrication—Standard Oil Co. (Indiana), 910 South Michigan Ave., Chicago, Ill., offers a series of monographs on industrial lubrication. Each monograph deals with a specific type of lubricant for specific uses.

Gas-Electric Sets — Gasoline-driven electric generators for various industrial applications are described and illustrated in an 8-page booklet by Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa. Specification tables are given.

Mixer—An illustrated folder leaflet by Robinson Manufacturing Co., Muncy, Pa., presents its special trowel type mixer for blending cold shortening with flour and its duplex sifter and mixer for making self-rising and prepared flour.

Flooring—The advantages of using Duratyle as the flooring in meat packing plants are described in a well-illustrated booklet of 20 pages by Drehmann Paving & Construction Co., 508 Glenwood Ave., Philadelphia, Pa.

Temperature Control — In a well-illustrated, 48-page bulletin, Foxboro Co., Foxboro, Mass., describes the operation and construction of its temperature controllers and their uses in industrial processes. The publication contains information on bulbs, charts, valves and accessories for temperature control equipment.

Motor Truck—A Reo 1½-ton Speed Wagon is described and its specifications are given in a folder leaflet of Reo Motor Car Co., Lansing, Mich.

Ecopometer—A photo-electric instrument for making delicate color matches and notation of disappearance points in the laboratory is described in a folder leaflet of Bausch & Lomb Optical Co., Rochester, N. Y. The instrument operates on the Wheatstone bridge principle.

Sanitation — Disinfectants and cleaners manufactured by West Disinfecting Co., 42-16 Barn St., Long Island City, N. Y., are described in a 24-page illustrated booklet of the company. Equipment for applying the products also is presented.

Lift Trucks—Specifications for and advantages of the lift truck made by Lewis-Shepard Co., 196 Walnut St., Watertown, Mass., are given in a 4-page circular, No. 104, by the company.

Metal Paint—A small folder leaflet describing C.M.C. Metallic Coating is offered by F. H. Langsenkamp Co., Indianapolis, Ind.

Closures—The essentials of closure performance and a discussion of the effect of poor and unattractive closures upon consumer appeal comprise the contents of a 4-page illustrated bulletin, entitled She's the Judge, prepared by Anchor Cap & Closure Corp., 22 Queens St, Long Island City, N. Y.

Valves—The different types of valves manufactured by Homestead Valve Manufacturing Co., Coraopolis, Pa., with illustrations, specifications and price lists, comprise the subject matter of the new Reference Book No. 36 issued by Eastern Steam Specialty Co., 125 Barclay St., New York, N. Y. Some 50 industrial applications of the equipment are shown pictorially.

Sulphuric Acid vs. Metals—Technical information on the corrosion of metals by sulphuric acid is given in a 12-page bulletin of International Nickel Co., Inc., 67 Wall St., New York, N. Y.

CONSTRUCTION NEWS

	Construction Pending	Contracts Awarded — No. Awards	Awarded August	Cumulative 1932 Total
Bakery Products	$73,500	17	$1,190,000	$2,648,000
Beverage	.....	7	.....	422,000
Canning and Preserving	160,000	14	165,000	650,000
Confectionery	28,500	1	.....	30,000
Grain Mill Products	750,000	19	411,500	3,814,500
Ice, Manufactured	30,000	37	69,000	1,751,000
Meats and Meat Products	68,500	27	300,000	1,947,700
Milk Products	370,000	37	286,000	3,126,000
Sugar	.....	1	.....	40,000
Miscellaneous	1,410,000	22	67,000	2,373,380
Total	$2,890,500	182	$2,488,000	$16,802,580

PROPOSED WORK BIDS ASKED

Bakery—Santo Francesco, 11 Wisteria St., Salem, Mass., plans the construction of a 2 story, 45 x 55 ft. bakery. Estimated cost $28,500. L. Audit, 15 Essex St., Salem, is architect.

Bakery — Concord Public Market, 9 North Main St., Concord, N. H., plans the construction of a 2 story, basement, 40 x 80 ft. bakery. Estimated cost $12,000 to $15,000. N. Simons, 33 North Main St., Concord, is engineer and architect.

Baking Plant — Walter Freund Bread Co., 4479 Chouteau Ave., St. Louis, Mo., preliminary plans by W. A. Lucas, 3411 Halliday Ave., for a 2 story, 40 x 200 ft., baking plant addition on Chouteau Ave.

Bakery—I. J. Ouelette, Kedgwick, N. B., in market for modern bakery equipment.

Candy Plant—W. Welde, 401 South Ave., Westfield, N. J., taking bids for 2 story candy making plant for Westfield Candy Kitchen, Inc., 171 E. Broad St., Westfield. Estimated cost $28,500.

Confectionery Plant Addition — Ormond's Limited, 326 West Cardova St., Victoria, B. C. will build boiler house 242 Mary St.

Dairy Exposition Building—A. Gousior, Century of Progress, Burnham Park, Chicago, Ill., opens bids Sept. 7, for construction of a dairy exposition building. Estimated cost $105,000. D. H. Burnham, Administration Bldg., Burnham Park is architect.

Condensing Plant—Gordon Baking Co., 2303 East Vernor Highway, Detroit, Mich., having plans prepared by Pollmar, Ropes & Lundy, 2539 Woodward Ave., Detroit, Mich., archts., for a 1 story, 82 x 100 ft., condensing plant, at La Grange, Ind. Estimated cost $40,000.

Dairy Buildings—C. W. Foster, Secy., State Administrative Bd., 202 State Office Bldg., Lansing, Mich., will receive bids until Sept. 14, for construction of 2 story dairy buildings for the Michigan Home & Training School, Lapeer, Mich. Estimated cost $30,000.

Creamery — Consumers Creamery, c/o Missouri Farmers Assn., W. Hirth, Pres., Columbia, Mo., plans the construction of addition to sour milk creamery, at Springfield. Estimated cost $60,000. Will seek loan from Reconstruction Finance Corp.

Dairy Plant — Tilton Fairfield Dairies, Newton, N. J., having preliminary plans prepared for 1 story, basement, dairy plant. Estimated cost $40,000.

Milk Products—M. Augenblick & Bro., 5 Bank St., Paterson, N. J., subsidiary of Borden Co., plans by M. Croissont, 53 Jacob St., Newark, Archt., for construction of a 1 story, basement milk products warehouse at Bank St. Estimated cost $40,000.

Dairy — Titusville Dairy Products Co., H. Rabild, pres. and mgr., South Washington St., Titusville, Pa., taking bids for 2 story, basement, 26 x 88 ft., dairy, also alterations to present building, South Washington Rd. Braziell & Anderson, 309-4th Ave., Pittsburgh, are architects.

Ice Cream Plant—Double-Dip Ice Cream Co., Beaumont, Tex., preliminary sketches for ice cream plant, incl. machinery and equipment. Private plans.

Grain Elevator—Weyauwega Mining Co., G. W. Moody, mgr., Weyauwega, Wis., having plans prepared for construction of a grain elevator. Auler & Jensen, Washington Blvd., Oshkosh, are architects.

Grain Elevator—United Grain Growers, Ltd., Dominion City, N. Y., plans grain elevator, concrete. Estimated cost $50,000.

Grain Elevator—Forsythe Elevator Co., High Bluff, Man. plans grain elevator. Estimated cost $200,000.

Grain Elevator—Union Terminal, Ltd., Port Arthur, Ont., and 300 Grain Exchange Bldg., Winnipeg, Man., is considering the construction of an addition to grain elevator on Current River at Port Arthur. Estimated cost $200,000.

Grain Elevator—Saskatchewan Wheat Pool, Duval, Sask., plans concrete grain elevator. Estimated cost $50,000.

Feed Mill—Success Mills, Inc., Kansas City, Kan., rebuilding cattle feed mill, recently destroyed by fire. $200,000 loss.

Storage Plant—Salt Lake & Utah R.R., Salt Lake City, Utah, plans the construction of a 1 story basement, 41 x 72 ft. egg grading and candling and feed storage plant to replace one destroyed by fire. Estimated cost $20,000.

Ice Manufacturing Plant—Torrington Ice Co., Torrington, Conn. plans construction of an ice manufacturing plant on North Main St. Raymond E. Palmer, 56 Suffolk St., Holyoke, Mass. is engineer. Estimated cost $30,000.

Cold Storage Warehouse — Port Authority, W. T. Eller, secy., Fort Lauderdale, Fla., plans combined pre-cooling, cold storage and bonded warehouse for Port Everglades. Estimated cost $1,000,000. Application for loan to Reconstruction Finance Corp.

Cold Storage—J. F. Sowards, 172 Montreal St., Kingston, Ont., plans altering building for cold storage plant, on Ontario St. Estimated cost $50,000. Arichtect not appointed.

Warehouse—Kellogg Co., Battle Creek, Mich., having plans prepared for a 6 story, basement warehouse. Estimated cost $150,000. A. Kahn, Inc., New Center Bldg., Detroit, Mich. is architect.

Farmers' Market — J. Holt, archt., 132 Market St., Paterson, N. J., taking bids for 1 story, 16 x 800 ft. farmers' market, East Railway and Dundees Aves. for Paterson Market Growers Co-Operative Assoc., A. Hillman, pres., East Paterson. Estimated cost $40,000.

Plant—Bosie Vegetable Products Co., J. R. Pardieck, pres., Chipito and Last Sts., Corpus Christi, Tex., plans dehydrated vegetable plant in manufactured form of powder and flakes from onions, garlic, peppers. Machinery and equipment moved from plant in California for present needs. Plans purchase of new machinery and equipment in 1933.

Packing Plant — Mission Citrus Assn., c/o B. M. St. Strong, Mission, Tex., taking bids for construction 2 story, 16 x 66 ft. packing plant to include 8 color'ng rooms and loading trackage for 104 cars of fruit per day. Estimated cost $20,000. Private plans.

Packing Plants—Missouri Pacific Ry. Co., Mission and San Antonio, Tex. plans the construction of 3 new citrus fruit and truck packing plants. Estimated cost $50,000. Company Eng. Dept. are engineers. Owner is interested in prices for machinery and equipment.

Market—Campbell Realty Co., 6620 Broadway, San Antonio, Tex., plans the construction of a market for truck producers including 130 steel stalls 10 x 20 ft. each. Private plans. Owner will soon purchase equipment and material.

Fruit Storage Plant—Oxford Fruit Growers Co-operative Ltd., Woodstock, Ont., plans fruit storage plant, on Mill St., including refrigerating equipment, etc. Estimated cost $50,000. Margeson & Babcock, 210 Dundas St., W. Toronto, are engineers.

Packing Plant Addition—Western Meat Co., plans construction of addition to packing plant. Estimated cost $40,000 or more.

Yeast Plant—Fleischmann Co. of California, 245 11th St., San Francisco, Calif. plans yeast manufacturing plant at Oakland. Estimated cost $100,000 or more. Architect not appointed.

CONTRACTS AWARDED

Bakery—Borck & Stevens, 925 Housatonic Ave., Bridgeport, Conn., awarded contract for a 1 and 2 story bakery addition, to E. & F. Construction Co., 94 Wells St., Bridgeport. Estimated cost $30,000.

Milk Distribut'ng Plant — Bordens Farm Products Co., Inc., 163 State St., Hackensack, N. J. awarded general contract for 1 and 2 story, basement, milk distributing plant, State St., to A. A. LaFountain, Inc., Beach St. and Railroad Ave. Estimated cost $40,000.

Dairy—Wilmore Real Estate Co., 509 15th St., A. Burgess, in charge, Windber, Pa., awarded contract for 1 story, 27 x 60 ft. dairy, on Windber-Johnsontown Rd., near here, to Windber Lumber Co. Private plans.

Dairy Plant—Turtle Lake Cooperative Co., F. Nelman, secy., Turtle Lake, Wis., awarded contract for dairy plant to Koser Bros. Co., Almena. Estimated cost $40,000.

Dairy Plant—Glendale Dairy Co., Dufferin St. and Bowie Ave., Tononto, Ont., awarded contract for 1 story, dairy plant, to Rogers, Sanderson & Watson, Lumsden Bldg. Estimated cost $30,000.

Warehouse and Mill—Las Vegas Land & Water Co., Pacific Electric Bldg., Los Angeles, Calif., and Pomona Grain & Milling Co., Pomona, awarded contract for 1 and 2 story, basement, 60 x 150 ft. warehouse and mill at Pomona, to Bannister-Field Co., Ltd., 4101 Goodwin Ave., Los Angeles. To exceed $28,500.

Grain Elevator—United Grain Growers Terminals, Ltd., lessees, 532 Marine Bldg., Port Arthur, Ont., awarded general contract for 1,000,000 bu. addition to Grain Elevator 3, Burrard Inlet, Vancouver, B. C., to Northern Constr. Co. and J. W. Stewart, Ltd., 736 Granville St., $250,000.

Grain Elevator — Vancouver Harbor Comn., Vancouver, B. C. awarded contract for addition to Grain Elevator No. 1 to Carter Halls Aldinger Co., Ltd., Standard Bank Bldg., Vancouver, $93,000. J. S. Metcalfe Co., 837 West Hastings St., Vancouver, engrs.

Warehouse—Kimbell-Diamond Milling Co., J. P. Smith, genl. mgr., Fort Worth, Texas, awarded contract for 2 story, 100 x 114 ft. warehouse to Jones-Hettelsater Constr. Co., 600 Mutual Bldg., Kansas City, Mo.

Feed Mill—R. S. Warner, Alliance, O., awarded contract for 3 story, 52 x 72 ft., feed mill to C. E. Eddleblute, Alliance; steel to Hiner Structural Steel Co., Canton; brick to Stark Brick Co.., Canton.

Warehouse—First National Stores Inc., Oakland Ave., East Hartford, Conn. awarded contract for 1 story, 80 x 100 ft. produce warehouse with cold storage facilities, to S. C. Poriss Co., 175 Enfield St., Hartford. Estimated cost $28,500.

Food Storage Building—Bd. Trustees, Miami University, Oxford, O., awarded contract for 2 story 64 x 160 ft. food storage and preparation building, to C. L. Knowlton, Bellfontaine, $68,700; plumbing and heating, to Esswein Heating & Plumbing Co., 546 West Broad St., Columbus, $10,180.

Fruit House—Great Northern Ry. Co., Railroad Bldg., St. Paul, Minn., awarded general contract for 2 story, basement, 60 x 120 ft., fruit house at St. Cloud to Edward Hirt, 901 4th Ave. S. Estimated cost $100,000.

Beef Plant — City Beef Co., 86 Savoy St., Bridgeport, Conn., awarded contract for a 2 story 40 x 90 ft. slaughter house and storage plant at 567 Asylum St., to H. Barker, 86 Savoy St., Bridgeport, Conn. Estimated cost $25,000.

Storage Warehouse—Swift & Co., Union Stock Yards, Chicago, Ill. awarded contract for 76 x 200 ft. storage warehouse in Spencer, Iowa to Spencer Construction Co., Spencer, $40,000.

Packing Plant—R. Lee Parker Co., Washington Rd., Natchez, Miss., plans rebuilding meat packing plant, Washington Rd., with local labor. Estimated cost $28,500.

Packing Plant — Sieloff Packing Co., 4329 Natural Bridge Ave., St. Louis, Mo., awarded contract for a 3 story, basement, 80 x 170 ft., packing plant addition, 4329 Natural Bridge Ave., to A. H. Haeseler, 2346 Palm St., $56,698. Owner will take bids Sept. 1, for office and stores building.

PATENT DIGEST

Baking and Milling

Air Conditioned Fermentation Cabinet for Experimental Baking Purposes—Clyde H. Bailey, St. Paul, Minn., to General Mills, Inc., Minneapolis, Minn. No. 1,859,613. May 24, 1932.

Layer-Cakes Iced Mechanically—Harry E. Keck, Pittsburgh, Pa. No. 1,859,971. May 24, 1932.

Pie-Crust Forming Machine—Charles A. Costigan, Los Angeles, Calif. No. 1,860,705. May 31, 1932.

Method of Preparing Molasses for Yeast Growth—William Gordon Bennett, Epsom, and Arthur Maurice Peake, London, England, to Standard Brands, Inc., New York, N. Y. No. 1,860,832. May 31, 1932.

Method of Packaging Dough in Sheet Form so That It Is Divided Into Portions by Carton Partitions—Charles Lorber, Louisville, Ky. No. 1,861,124. May 31, 1932.

Pies Wrapped in Wax Paper by Machine Equipped With Feeding and Crimping Units—Albert Remillard, Waterville, Me. No. 1,861,551. June 7, 1932.

Traveling-Tray Bake Oven—Edward Proctor, London, England. No. 1,861,719. June 7, 1932.

Baking Pans Greased in Automatic Spraying Machine—Sven P. Larson to Larson Machine Co., Ltd., Berkeley, Calif. No. 1,862,380. June 7, 1932.

Doughnut Cooker With Network Frame for Receiving and Holding Doughnuts During Cooking Operation—Philip Szulczewski, Milwaukee, Wis. No. 1,863,210. June 14, 1932.

Bakery Mixtures Subjected to Ultra-Violet Rays During Emulsification and Mixing—William James McGroarty to Nashville Foods, Ltd., Toronto, Ont. No. 1,863,277. June 14, 1932.

Confectionery

Endless Type Conveyor for Discharging Chocolates From Coating Machine—Max Marc Guggenheim, Saginaw, Mich., and George Ralph Baker, London, England to Baker Perkins, Inc., Saginaw, Mich. No. 1,859,205. May 17, 1932.

Equal Parts of Ground Flaxseed and Peanut Butter Mixed to Form a Confection Filling in a Shell Made of White Sugar, Cream of Tartar and Sassafras Oil—Mabel Knepper Heisler, Orwigsburg, Pa. No. 1,859,206. May 17, 1932.

Method of Making Taffy Containing Fat, Sugar, Water and Vegetable Lecithin—Stroud Jordan, Brooklyn, N. Y., to Ross & Rowe, Inc., New York, N. Y. No. 1,859,240. May 17, 1932.

Kneading and Mixing Machine for Confectionery Manufacture—Frederich Aeschbach, Aarau, Switzerland. No. 1,859,690. May 24, 1932.

Chocolate Produced in Continuous Manner From Raw Cocoa Beans to Finished Chocolate Liquor in Coordinated Gravity Feed Units—Dale G. Steeley, Arlington, Mass., to W. F. Schrafft & Sons Corp., North Boston, Mass. No. 1,862,166. June 7, 1932.

Dairy and Egg Products

Butter Fat Removed From Sour Milk by Conditioning of Milk Before Centrifuging—Herman D. Wendt to the Sharples Separator Co., West Chester, Pa. No. 1,861,559. June 7, 1932.

Cheese Processed by Grinding and Then Heating Under Pressure in Vertical Unit—Henry Murray Scott, Sweetwater, Tenn. No. 1,861,721. June 7, 1932.

Milk Cooled as Received Into Containers of Vacuum Milking Machines—Eugen Raven-Rosen-Baum, Gut Radenshorst and Alfred Domscheit, Junterbog, Germany. No. 1,861,898. June 7, 1932.

Fruits and Vegetables

Legumes Precooked Under Vacuum and Dried for Marketing—Alfred L. Chamberlain, Port Huron, Mich. One-eighth to George B. Willcox, Saginaw, Mich. No. 1,859,279. May 24, 1932.

Dates Seeded and Shredded Mechanically—James H. Northrop, Santa Ana, Calif. No. 1,859,458. May 24, 1932.

Fruits and Vegetables Mechanically Filled Into Cans—Hal W. Norgaard, Oakland, Calif., to California Packing Corp., San Francisco, Calif. No. 1,860,720. May 31, 1932.

Fruit Peeling Machine—Hjalmar Goranson and David Goranson, San Jose, Calif., to California Packing Corp., San Francisco, Calif. No. 1,861,084. May 31, 1932.

Mechanical Means of Shelling Cocoanuts—Hugh C. MacDougall, West New York, N. J., to Franklin Baker Co., Hoboken, N. J. Nos. 1,860,745 and 1,860,746. May 31, 1932.

General Equipment

Refrigerated Display Case for Frozen Foods—Clement V. Hill to the C. V. Hill & Co., Inc., Trenton, N. J. No. 1,859,826. May 24, 1932.

Gas-Proof Storage Chambers—Charles L. Jones, Pelham, N. Y., and William L. Kuehnle, Garden City, N. Y., to DryIce Corp. of America, New York, N. Y. No. 1,863,484. June 14, 1932.

Macaroni and Noodles Dried in Chamber Designed to Move Materials Through Successive Temperature Changes in Contact With Regulated Flow of Air—Albert P. D. Belanger, Chicago, Ill. No. 1,864,178. June 21, 1932.

Showcase for Frozen Foods With Refrigerating Coil Above Display Compartment—Theodore A. Jostedt to Hussmann-Ligonier Co., St. Louis, Mo. No. 1,865,761. July 5, 1932.

Chill Roll Cooled by Direct Expansion of Liquefied Gaseous Refrigerant—Anson W. De Vout and Richard W. Regensburger to Industrial Patents Corp., Chicago, Ill. No. 1,866,509. July 5, 1932.

Foodstuffs Quick-Frozen in Tunnels Built to Accommodate Trucks Which Divide Tunnel Into Compartments—Alvin H. Baer to Frick Co., Waynesboro, Pa. No. 1,867,546. July 19, 1932.

Meat Packing

A Unit Conveyor-Type Machine for Twisting Sausages—Charles H. Allen and Edward C. Robbeloth to the Packers Specialty Co., Pittsburgh, Pa. No. 1,866,497. July 5, 1932.

A V-Shaped Smokestick for Sausages Whose Undersurface Directs Smoke Toward Points of Contact—Gustave L. Vogt, Philadelphia, Pa. No. 1,867,238. July 12, 1932.

Meat Stuffing Machine With a Plurality of Stuffing Units—Walter Bauer to Libby, McNeill & Libby, Chicago, Ill. No. 1,860,220. May 24, 1932.

Method of Curing Casings—Perry J. Long to Industrial Patents Corp., Chicago, Ill. No. 1,860,335. May 24, 1932.

Shock-Absorbing Meat Rack for Refrigerator Cars—William A. Geiger to W. H. Miner, Inc., Chicago, Ill. No. 1,863,714. June 21, 1932.

Meat Steaks Produced by Spirally Wrapping Single Meat Mass With Overlapping Parchment Paper Tape and Slicing Before Freezing—Harden F. Taylor, Scarsdale, N. Y., to Atlantic Coast Fisheries Co., New York, N. Y. No. 1,864,284. June 21, 1932.

Miscellaneous Products and Processes

Coffee Given Ultra-Violet Ray Treatment Before Roasting and Coating With Cocoa—Daniel Joseph Kennedy, Vancouver, B. C., Canada. No. 1,859,740. May 24, 1932.

Sugar Crystals Built Up During Refining Operation by Vigorous Agitation of Raw Sugar and Sugar-Containing Liquid With Air in Finely Divided Form—Claus A. Spreckels, New York, N. Y. No. 1,862,719, June 14, 1932.

Sterilization of Food Products by Subjection to Oscillations Having a Frequency of Between 60 and 600 Million Per Second—Frederik E. Hoermann, Hastings, Minn., one-fourth to Henry M. Robertson and one-fourth to Joseph M. Santo, St. Paul, Minn. No. 1,863,222. July 14, 1932.

Automatic Butter Cutting Machine—Howard & Morris to the Automat Molding & Folding Co., Toledo, Ohio. No. 1,861,160. May 31, 1932.

Copies of Patents

Complete specifications of any United States patent may be obtained by remitting 10c. to the Commissioner of Patents, Washington, D. C.

Photostatic copies of foreign patents may be obtained at the same address, prices being forwarded on application.

Copies of patents should be ordered by number, as titles used in this digest seldom correspond with title of patent.

THE GOVERNMENT PUBLISHES

DOCUMENTS ARE AVAILABLE *at prices indicated from Superintendent of Documents, Government Printing Office, Washington, D. C. Send cash or money order; stamps and personal checks not accepted. When no price is indicated, pamphlet is free and should be ordered from bureau responsible for its issue.*

Some Unusual Markets for Fish and Shellfish, by F. F. Johnson. Bureau of Fisheries Circular No. 11.

Equipment for City Milk Plants, by C. E. Clement and others. Department of Agriculture Circular No. 99.

Present Status of Pasteurization of Milk, by S. Henry Ayers and others. Department of Agriculture Bulletin 342; revised June, 1932.

Bacterial Counts of Milk as Affected by Some Milk-Plant Practices, by C. S. Leete and L. H. Burgwald. Department of Agriculture Circular No. 222; 5 cents.

Response of Sweet Corn to Varying Temperatures From Time of Planting to Canning Maturity, by C. A. Magoon and Charles W. Culpepper. Department of Agriculture Technical Bulletin 312.

Guide to Grain-Trade Statistics, by H. S. Irwin. Department of Agriculture Miscellaneous Publication No. 141.

Car-Lot Shipments and Unloads of Important Fruits and Vegetables for 1929 and 1930. Bureau of Agricultural Economics Statistical Bulletin No. 38.

Care and Management of Dairy Cows, by T. E. Woodward and others. Department of Agriculture Farmers' Bulletin 1470; revised June, 1932.

Bibliography on the Chemistry of the Genus Citrus, by M. B. Matlack. Bureau of Chemistry and Soils unnumbered pamphlet; mimeographed.

Adequacy and Reliability of Crop-Yield Estimates, by Charles F. Sarle. Department of Agriculture Technical Bulletin No. 311.

Survey of Current Business 1932 Annual Supplement. Bureau of Foreign and Domestic Commerce; 40 cents. Elaborate statistical summary covering 10 years' data.

Domestic Value—Conversion of Rates. U. S. Tariff Commission Report No. 45, Second Series. Tabulation of the ratio of tariffs to domestic value of imported goods.

Production Statistics from 1931 Census of Manufactures in preliminary mimeographed form for: macaroni, spaghetti, and other alimentary paste; beet sugar; cane sugar; chocolate and cocoa products; rice cleaning and polishing.